THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXIV. No. 852.] LONDON, SEPTEMBER 9, 1879. [31ST YEAR.] Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

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OFFICES:
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Resists Sulphuretted Hydrogen. Does not Blister, Crack, or Flake off. Has very large surfacing powers.
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Gas, Water, & Sanitary Purposes,
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JOSEPH COWEN and CO.,
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
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EFFECTUALLY PREVENTS AND ARRESTS CORROSION.
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IS CHEAPER AND MORE ECONOMICAL THAN ANY OTHER.

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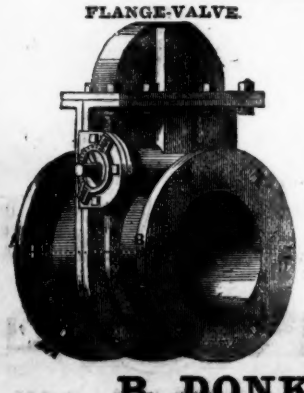

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List of Prices, with dimensions of all Sizes up to 48 inches, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

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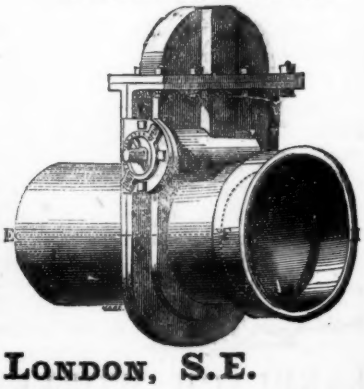

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Special "REGULUS COCKS" manufactured to stand Acid.

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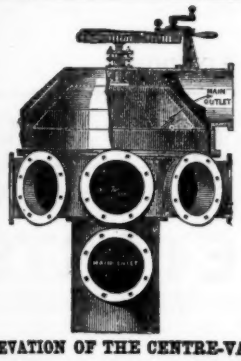

ELEVATION OF THE CENTRE-VALVE.

PLAN OF THE VALVE.

PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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CHARGING AND DRAWING GAS-RETORTS,
And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

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The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

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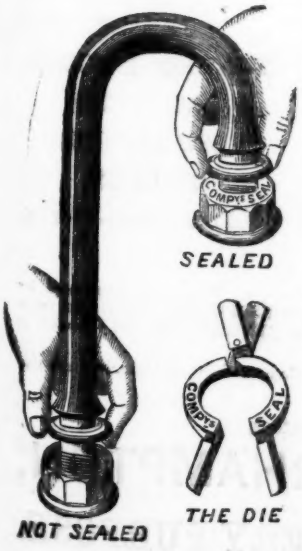
COUNTER-SUNK SEAL GAS-METER UNIONS,

As Supplied to The Gaslight and Coke Company.



These Unions practically place a Gas Company's property under lock and key, by rendering it impossible to disconnect at any joint at which gas could be obtained unregistered, without destroying the Company's seal or signature, whilst a small cover absolutely protects the impression from accidental injury.

A meter having been fixed with one of these Unions on the main-cock, and another on the inlet, a few pinches of specially prepared crushed sealing-wax is placed in the cup, and being melted with a blow-pipe, the wax runs between the reversed threads, the circular tong-shaped die will then give a sharp impression of the Gas Company's title, an operation requiring about two minutes in all to perform.

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Are supplied in all sizes, either as Caps and Linings or Barrel-Unions, and at a small additional cost over existing connections.

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Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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SWANWICK CANNEL.

Illuminating power, 24 candles. Good Coke, 11½ cwt. to the ton.

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ESTABLISHED IN 1860.

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The Dunston Engine Works Co.,

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Are the Sole Manufacturers of

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The last-named Machine (without the Pulveriser) makes the best and most durable Coke Breaker.

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It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

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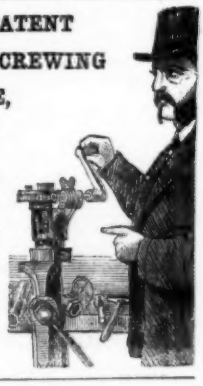
PORTABLE PIPE SCREWING

MACHINE,



For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great a tisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

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IMPROVED
COMPENSATING GAS-METER.
HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

These Meters can now be supplied in either TIN-PLATE or CAST-IRON CASES, and OLD METERS converted to this plan. GAS COMPANIES and CORPORATIONS will find it to THEIR ADVANTAGE to adopt these Meters.

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WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,

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Established 1830.

THE "RELIABLE" STEAM-PUMP

IS NOW IN USE AT NEARLY ALL THE

LEADING GAS AND CHEMICAL WORKS THROUGHOUT THE KINGDOM,

INCLUDING

THE GASLIGHT AND COKE CO., BECKTON NEW WORKS (24 supplied),
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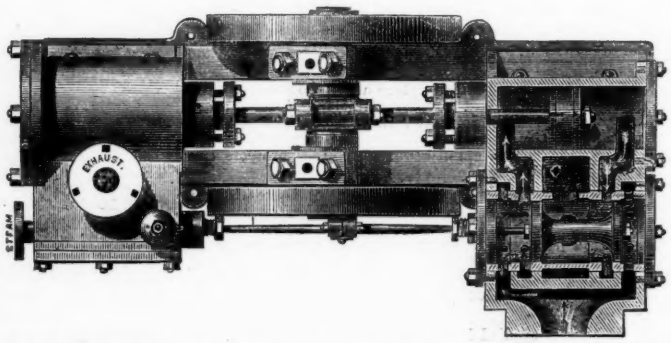

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and other Gas-Works.

The "RELIABLE" is undoubtedly, by means of its Piston Valve, the best Pump made for Gas-Works use. It is specially adapted for pumping TAR, OILS, AMMONIACAL LIQUOR, &c., and is the ONLY Pump that will do so SUCCESSFULLY and at the same time discharge double the quantity of liquid. The "RELIABLE" is the only Pump manufactured that is REVERSIBLE, and therefore is invaluable in frosty weather.

J. E. & SONS IMPROVED "RAM" STEAM-PUMPS, which are made with both Single and Double Rams and Steam Cylinders, are also admirably adapted for Gas-Works use.

For Price Lists and Testimonials, apply to the Sole Makers and Patentees,

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MAKERS AND PATENTEES OF

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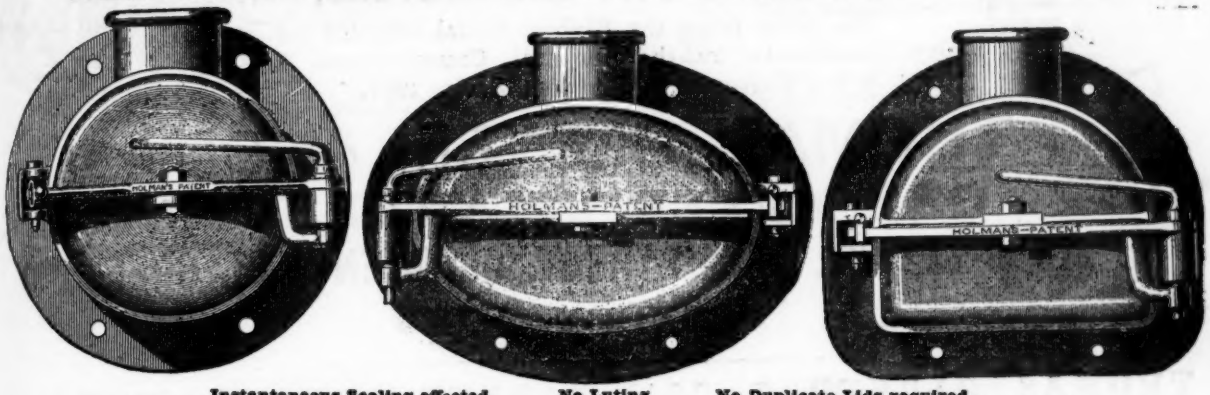
SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

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The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

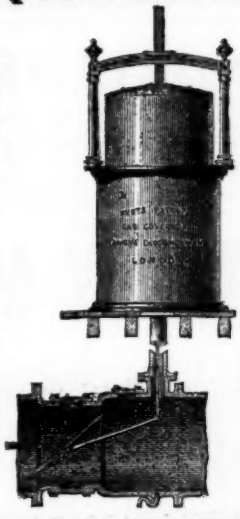
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1878.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

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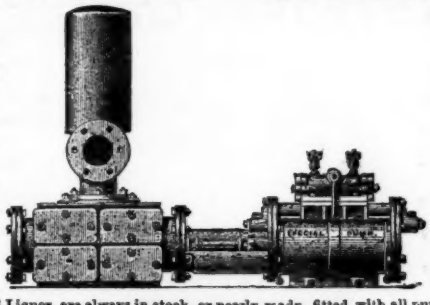
THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1¼	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	21
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

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Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

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London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters bv the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

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1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
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5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

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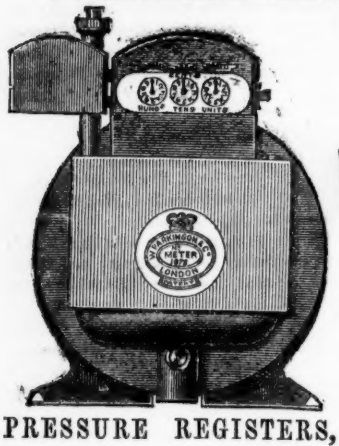

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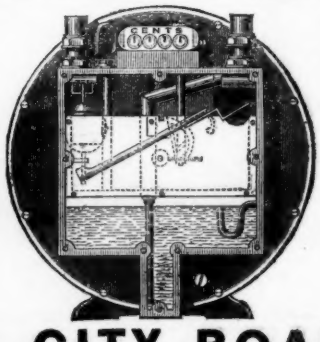
In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 9, 1879.

Circular to Gas Companies.

THE great "wen," as our old friend Cobbett called the Metropolis, about seventy or eighty years ago, still continues to increase in size, and there is at present no appearance of the evils Cobbett so forcibly prophesied. Large aggregations of population are not the danger to health or property they are often supposed to be; indeed, to some forms of property—for example, gas property—they are distinctly advantageous. Our readers will find, in another place, our abstract of the accounts of the Metropolitan Gas Companies for the year 1878, which shows the steady, continued progress which is made by these undertakings. In every instance an increase of gas-rental will be observed—in some cases, relatively large; in one, relatively small. We may mention that the rental in 1878 of all the Companies together amounted to £2,633,888, which shows an increase of £145,583 on that of the preceding year. This is fair progress, which we hope will be exceeded during the current year. We are sorry to see that the decrease in the sum realized for residuals was very considerable. The Chartered Company alone suffered to the extent of £26,950; and, putting all the Companies together, we find a total decrease of £22,709. This is a somewhat serious matter, even when such large undertakings as the Metropolitan Gas Companies are concerned. Capital and borrowed money now invested in the Companies amounts to £12,232,514, on the bulk of which 10 per cent. has to be paid. It must require no small share of skill and energy to get together the cash for dividends and interest on such a large amount of capital. As usual, we give the gross profit per ton of coal carbonized by each Company, which is: Chartered, 13s. 2·40d.; Surrey Consumers, 12s. 7·32d.; South Metropolitan, 12s. 5·94d.; Phœnix, 12s. 3·84d.; Commercial, 11s. 10·02d.; London, 11s. 3·66d.

It would obviously lead to fallacy if inferences were to be drawn from these figures as to the relative positions of the Companies. This much may be said, that each one exhibits excellent working results. The only other thing we care to notice is the table that follows, which shows the working results in another shape:—

TABLE *of the Residuals and Gas made, per Ton of Coals Carbonized, by the Metropolitan Gas Companies in the Year* 1878.

Name of Company.	Coke per Ton of Coals, in Bushels.	Breeze per Ton of Coals, in Bushels.	Tar per Ton of Coals, in Gallons.	Ammoniacal Liquor per Ton of Coals, in Gallons.	Gas Made, Feet per Ton
CHARTERED	33·61	3·21	10·56	31·11	10,289
COMMERCIAL	34·58	3·17	9·36	32·77	10,109
LONDON	34·94	4·08	10·37	20·57	9,933
PHŒNIX	36·00	2·24	9·86	30·03	10,041
SOUTH METROPOLITAN	35·52	2·85	10·77	21·64	9,849
SURREY CONSUMERS	32·72	3·29	10·67	20·49	9,941
Mean per ton	34·12	3·17	10·40	29·44	10,183

It is remarkable how little is the variation in the amount of gas made when coals of equal quality are used. We have, for example, in this table, only a range of 440 feet per ton between the highest and the lowest. This, however, says nothing; it is probably a question of the use of cannel, and therefore of cost. It is likely that the 9849 feet per ton is, after all, the cheapest gas.

In concluding these remarks, we can only congratulate the Metropolitan Gas Companies on their continued prosperity. There is nothing we know of that will at all detract from it. They have only to pursue their present course of furnishing good and pure gas, and they must prosper. The "wen" still grows, and must have gas.

We learn from an authentic source that the Board of Trade have at last settled the scheme of amalgamation between the South Metropolitan and the Surrey Consumers Companies. The scheme differs a little—merely as to the arrangement of dividends—from that originally proposed; but, so far as we have heard, leaves the Surrey Consumers Company in a very favourable condition. It will, we presume, shortly receive the consent of the Queen in council, and then it will be made public. It is no secret, we believe, that since the settlement of this scheme the South Metropolitan Company have made fresh overtures for union with the Phœnix Company, from whom, however, an answer has not as yet been received. We cannot imagine that repeated refusals will follow the invitations of the South Metropolitan Company. The financial advantages which union would bring to the Phœnix Company are so apparent that it is to be wondered that the smallest hesitation takes place. Perhaps on the present occasion better counsels will prevail, and that we shall shortly have to announce that amalgamation has been decided upon. After this union has taken place the London Company will stand isolated, probably in the long run to their extreme regret.

Progress has been made with the arrangements for illuminating the Picton Reading-room at Liverpool by means of the electric light. The Town Council have authorized the Library Committee to arrange with the British Electric Light Company to expend £729 on the purchase of a new engine, for driving some machines to produce the light for the illumination of the building, the engine at St. George's Hall not being found sufficiently steady, although efficient so far as power was concerned. At the same meeting of the Town Council they wisely authorized the expenditure of £163 by the Liverpool Gas-Fittings Company, who will instal a system of gas apparatus for use at any moment to replace the electric light should a failure happen. This is a wise precaution, for electric lights sometimes behave in an eccentric manner, and go out just at the moment the luminosity is most required. Although gas may, according to Mr. Deacon, be dearer than the electric light, it is well that the reading-room should be furnished with this additional means of illumination in case of need.

The last yearly meeting of the Lancaster Gas Company was held on the 27th ult. The Company have had a very successful year's working, and are in a position to pay maximum dividends and carry forward a large balance. It is enough to make us regret the disappearance of so prosperous a Company; but, as our readers know, the concern is now being worked for the benefit of the Corporation, and it passes entirely into the hands of the latter on the 1st of July next year. The profits of the past twelve months were £4747, and there was a balance brought forward from the previous year of £222, making a total profit available for dividend amounting to £4970. As the capital of the Company is only £30,000, maximum dividends were, of course, declared, and the disposal of the large balance was left for further consideration. The works, as we have said, have practically passed into the hands of the Corporation, an arrangement having been made by virtue of which the former are to receive £80,000 in cash, which is equivalent to £266 for each £100 of stock. The Lancaster Gas Act, 1879, says that the purchase money is to be paid in cash, but it will be seen by the report we publish there was some talk on the part of the Directors of accepting annuities. This point does not appear to have been yet settled; but, in any case, whether a lump sum or annuities are paid, we can congratulate the Shareholders on having made a good bargain.

The Wrexham Gas Company have done very well in the past half year. They paid an interim dividend of three and a half per cent. in March last, and are now in a position to pay a similar dividend for the past six months. But even when this is done a considerable balance is carried forward, which enables the Directors to pay two and a half per cent. in liquidation of back dividends of 1873 on consolidated stock, and one per cent. upon the first issue of shares for the same purpose. The Wrexham Company deal very liberally with their consumers. They reduced the price of gas when there was no immediate prospect of making up the loss arising from the reduction. But, somehow or other, it was done; and thus the accounts of the past half year—when a decrease in the charge for gas of threepence per thousand feet had been made, which ought to have resulted in a loss of £200—show an increased income of £78. Wrexham, we are sorry to say, appears in a somewhat stagnant condition, which we hope will not last. In any case, by reducing the price, the Company are doing their best to induce an increase of consumption.

The half-yearly meeting of the Canterbury Gas and Water Company was held on the 29th ult. It is unnecessary to separate the gas and water accounts; it is sufficient to say that the profits of the six months enable the combined undertaking to pay a dividend of eight per cent. per annum. The considerable reserve which the Directors have in hand, and which has hitherto been used for trading and other purposes, is now to be invested in Consols, for the purpose of equalizing dividends.

The Derby Gas Company held their half-yearly meeting on the 30th ult. It goes without saying that the Company are in a very prosperous condition. They pay maximum dividends, and carry forward £2724. We are pleased to see that the Directors are about to make a reduction of price in the outlying districts. There has been hitherto a wide difference between the cost of gas in the borough and in the outlying districts, which may possibly have had the effect of keeping down consumption in the latter. The price within the borough is now very moderate, but the Directors hope to reduce it still further, when Derby will be one of the cheapest supplied towns in the kingdom. Extensive alterations, which it is quite clear are absolutely necessary, are about to be made to the works. Derby grows, and with a revival of trade will grow still faster; the Directors are, therefore, perfectly right in taking time by the forelock; and providing for the future requirements.

The Lewes Gas Company are not quite able to pay full dividends out of current profits, but they are not far short. They have only to take £60 from the unappropriated profit of previous half years, which enables them to make up statutory maximum dividends. It seems that some extensive additions and alterations are now being made at the works, which renders the present an anxious time for the Directors. They have, however, only to go on quietly extending and improving their works, and they must in the event succeed in adding considerably to their business.

The Sunderland Gas Company held their annual meeting on the 27th ult., when, as usual, maximum dividends were declared. The reduction of price which was made last year resulted in a diminished income, which was, however, subsequently made up. The Directors seem to see their way to a still further reduction in price, which they may safely calculate will increase consumption and add to their profits. That they make a profit this year is partly owing to the reduced price of coal. Coke has failed to bring them in a proper remuneration, but this will probably be made up in the current year.

The annual accounts of the Glasgow Corporation Gas-Works have been presented to the Town Council. They show, as might be expected, a very satisfactory year's working, so much so that the Gas Committee recommend a reduction of 2d. per 1000 feet in the price of gas, which it is estimated will then leave a good balance for the ensuing year. The gross revenue of the undertaking for the past year amounted to £337,963, and the gross expenditure—which included the sum of £17,955, the usual percentage written off capital for depreciation for the year—to £259,352, showing a balance carried to profit and loss account of £78,610. Annuities, interest, and sinking-fund having been provided for, there still remained a surplus of £7281. There seems to be some little hitch in the Council as to the way in which part of this surplus should be appropriated, and the confirmation of the minutes is postponed to the next meeting.

We have received from two correspondents accounts of the disaster to a gasholder at Congleton. In popular language it was called an "explosion;" but we presumed, when referring to the accident last week, that all our readers knew a gasholder cannot explode when it is full of gas. This was the case at Congleton; but an explosion did occur, though not in the holder. There are two holders at Congleton, one of which became over-filled, and "blew." The escaping gas made its way to the purifying shed, and there, becoming mixed with air and ignited by a burning jet of gas, caused an explosion, which capsized the holder. Then the gas being fired, quietly burned itself out. The holder, it would appear, is utterly wrecked; but not in consequence of an explosion of gas within it. It has been often said in these columns that for an explosion of gas to take place a large admixture of air is necessary. The most explosive mixture, we believe, is one composed of nine parts of air to one part of gas—a proportion which is never likely to be found in a gasholder, even if air accidentally gained access to it.

The late Mr. Laming.—We have pleasure in acknowleging the receipt of £20 from Mr. George Livesey, for the widow of the late Mr. Laming. Mr. Livesey writes:—"I am very sorry to see that the widow of the late Mr. Laming, with whom for a long time I was in constant communication, is in want; and am glad to find you have undertaken to collect subscriptions. I enclose a cheque for £20, as a token of respect for a man whose abilities and character I highly esteem. I hope your efforts may be instrumental in obtaining substantial assistance."

Darenth Vale Gas Company.—Mr. John W. Field requests us to state that he has declined longer to remain an Auditor of this Company.

Bovey Tracey Gas Company.—On the 28th ult., this Company was registered with a capital of £2000, in £5 shares, for the purpose of acquiring land for the erection of gas-works, and for manufacturing gas in all branches.

Barnet District Gas and Water Company.—We have been asked to correct a slight mistake in the report, which appeared in last Journal, of this Company's meeting on the 29th ult. The gentleman who was elected Auditor in place of Mr. John Johnson, deceased, was Mr. Frederick Lennard (*not* Leonard), of Leicester Villa, New Barnet.

Glossop Gas Company.—In the reference in last issue (p. 367) to the meeting of this Company, on the 25th ult., it was stated that the report of the Directors, recommending a dividend at the rate of 10 per cent. per annum, and also a reduction in the price of gas, was adopted. We have since received a copy of the resolutions passed at the meeting, and find that the report was approved, "with the exception of the paragraph relating to the reduction in the price of gas."

Luton Water Company.—The half-yearly meeting of this Company—Mr. Mees in the chair—was held on Saturday, Aug. 30. The accounts showed a net profit of £1014 10s. 7d., a slight reduction compared with last half, owing to increase of assessment for local rates. The capital of the Company is £24,780. The report was adopted, and a dividend at the rate of 9½ per cent. per annum was declared. It is intended to increase the capital of the Company for enlargement of the works.

Manchester Corporation Gas Supply.—At the monthly meeting of the Manchester City Council last Wednesday, on the minutes of the Gas Committee being submitted for approval, Alderman Lamb said he had been anxious to get the year's report of the Committee's operations ready for that meeting, but he had not been able to do so. He was, however, in a position to state that they would be able to turn over to the credit of the Improvement Committee about the same amount as last year—namely, £50,000—and, under the circumstances, he thought this was very satisfactory.

The New Gas-Works at Bristol.—The report to be submitted to the half-yearly meeting of the Shareholders of the Bristol United Gas Company, on Wednesday, the 7th inst., states: "It affords the Directors great pleasure to be able to announce the very near completion of the new works of the Company at Stapleton. The building of these works has been carried on with unceasing vigour and attention by Messrs. Aird and Sons (the Contractors), under the able supervision of Mr. Fiddes (your Engineer), and the manufacture of gas will be commenced at the new premises within a few weeks from the present date. These works will be wholly completed, ready for the supply of gas, within ten months from the day of their commencement, and, considering their magnitude and the excellence of the workmanship, will be an example of energy and rapid execution which the Directors believe to be unprecedented in the history of gas lighting."

Water and Sanitary Notes.

We have to thank Mr. Baldwin Latham, C.E., for a very interesting and valuable paper on the temperature of town water supplies. We have been in the habit of reading in certain monthly reports that the water of some Metropolitan Companies was supplied warm and vapid, while that of other Companies was furnished cool and palatable. This was, no doubt, perfectly true; but then we had not the whole facts of the case stated. Mr. Latham shows to demonstration that the temperature of a water supply is exactly that of the main through which it flows—in other words, the soil in which that main is laid. The water is warm in summer no matter what its source, and cold in winter, the alteration of temperature being, to our minds, somewhat remarkable. Thus Mr. Latham has observed variations of 28° in the temperature of the water supplied to his house at Croydon between the months of July and January. This is a much larger difference than we should have anticipated, for we had imagined that the non-conducting soil would have preserved the water at nearly an uniform temperature, except in the case of periods of long frosts. Then, of course, the temperature of the soil would necessarily be depressed. We are greatly indebted to Mr. Latham for his table of monthly averages, but should have been glad to have had daily returns for some months of the year. The facts, however, are of the utmost importance, but they suggest a problem which is difficult to answer: How is water to be kept cool in the mains during summer? If diarrhœa be not prevalent so long as the water is under 60°, and cholera does not prevail unless the water is over 62°, it is of the greatest consequence that some means should be devised for keeping the water cool. This surely cannot be beyond the skill of such an eminent engineer as Mr. Latham to accomplish; but how mains are to be refrigerated we, of course, cannot tell.

There is another matter to which attention may be called. Drinking fountains are now largely used, and the temperature of the water in these deserves to be closely watched. Thousands of people—children especially—drink at these fountains, and, if the temperature of the water be raised above the point which Mr. Glashier and Mr. Latham represent as dangerous, it is a very important matter. Philanthropists may unwittingly be doing a great mischief when they supply children in summer with warm and vapid water. It is no matter, however, this year. We are free from any probability of an outbreak of severe diarrhœa, and for this year, at all events, the condition of the fountains may be disregarded.

The East London Water Company do not, we are sorry to see, stand well with the Industrial Dwellings Company. Great complaints have been made about a deficiency of supply to the buildings which belong to the Company. For some of the complaints there appears to be foundation; for others, not. It seems, and it is no doubt a fact, that at times water of the Company is not delivered as high as is required by their Act—viz., forty feet. This, however, we may take it, happens but seldom, and under peculiar circumstances. It may be regarded as a misfortune for the Industrial Dwellings Company that they have buildings so high that the pressure on the Water Company's mains will not attain to the required level. But this is not the fault of the Water Company. The Industrial Dwellings Company came into the district well knowing, we may presume, the conditions of the water supply; and the East London Water Company, who find it impossible to send water to the height required, are in nowise to blame for the alleged deficiency of supply. It is, of course, a misfortune that the Water Company cannot supply above forty feet. Other Metropolitan Companies deliver their water at a much greater elevation. Thus the Chelsea Company deliver it at the height of seventy-four feet, the New River Company at seventy-three feet, Grand Junction Company seventy feet, Southwark and Vauxhall Company fifty-five feet, and Kent Company fifty-five feet. But so far as the East London Water Company are now concerned it seems clear that the matter cannot be rectified without considerable trouble and expense. We are sorry for the inhabitants of the Industrial Dwellings Company's buildings, but we fear that for some time to come there will be no help for them.

The criticisms on the London water supply are not without their amusing side; for example, the correspondent of a daily contemporary announces that he has collected rain water, and given instructions to the New River Company to cut off his supply. At the present moment he is very well satisfied with the quantity and quality of the water he has, but we fancy he will quickly change his tone. Rain water soon begins to ferment, as the phrase goes, and emits a most intolerable stench. Perhaps it is in consequence of this that Mr. Roebuck has received a notice from the Sanitary Officer, for neighbours might well be annoyed at his proceedings. This gentleman, however, is very ill-informed as to the qualities of a safe water supply. Rain water collected from the roofs of houses is far more polluted with organic matter than the water of any great stream in the kingdom. We need not, of course, give this gentleman any advice, for we very well know that in a short time he will supplicate the New River Company to put on their water again, and be thankful when his supply is restored.

As continuous excitement is kept up as to the charges of the Water Companies in connection with rateable value, it may be worth mentioning that the quinquennial revision of the rateable value of property in the Metropolis takes place next year. The Parochial Officers are already preparing for it, and we may expect heavy additions to present ratings, and consequently numerous appeals. Water and Gas Companies all over the country are considered fair game for the addition of imposts, and next year we anticipate that the Companies ratings will be largely added to. But how about the water consumers? Are their charges to be added to in consequence of the increased value of Metropolitan property? This is a matter which the consumers friends should look into at once, though we do not see what relief can be gained till Parliament meets, and then probably matters will be left as they are. If it were a fact that water was charged for, in the Metropolis at all events, according to the rateable value of the premises, there might be a grievance. But, as a matter of fact, we know that is not the case. The Companies exercise sensible discretion, and charge according to what they believe to be the normal value of the premises. We fully anticipate a good deal of excitement over this new valuation, but it must be submitted to, and no doubt the results in the end will be taken quietly.

The Wrexham Water Company, a report of whose half-yearly meeting appears in another column, though not particularly successful, cannot be regarded as altogether unfortunate. They could only pay six per cent. on their consolidated stock, and five per cent. on the preference shares; and to do this they have been compelled to take a good part of the money from the reserve-fund. But still the Company make progress, which has, however, been much retarded during the past year by the bad weather and bad trade. The works are now in good order, extensive enough to give a supply to 24,000 people, and the water is of excellent quality.

Barrow-in-Furness Water Supply.—The Corporation of Barrow-in-Furness last Wednesday opened a new reservoir constructed by them at Pennington, near Ulverston. It has an area of 25 acres, and a capacity of 120 million gallons. The reservoir is connected with the original water-works by a tunnel, and the Corporation now have sufficient reservoir accommodation for a population of 80,000. The new works will not only supply Barrow, but Dalton, Ulverston, and other parts of the Furness district. The cost of the new works was £32,000.

Maidstone Water-Works Company.—The half-yearly general meeting of this Company was held on Monday, the 25th ult.—J. B. Green, Esq., J.P., in the chair. The Secretary (Mr. J. Case) read the Directors report, which stated that the water-rents for the quarter ending the 31st of December last amounted to £1257, that those for the following quarter realized £1284, and that the receipts from the same source for the June quarter were estimated at £1290. The balance-sheet showed a profit for the half year of £856 3s. 2d. The report further intimated that the Directors sought power to raise additional capital to the extent of £6000, and referred to the great saving now being effected in the consumption of coal by the use of the new machinery. The Chairman expressed a hope that the report would prove satisfactory to the Shareholders. They would, of course, have to wait patiently for the beneficial results of the recent large outlay of capital, but he might tell them that while in the ten weeks ending Aug. 24, 1878, 179 tons of coal were consumed, in the same period of the present year only 63 tons were used, thus showing an immediate saving of 116 tons. The report and accounts were unanimously approved, and an increase of £20 per annum was voted to the remuneration of the Secretary. An extraordinary meeting was then held, for the purpose of empowering the Directors to raise £6000 additional capital, and it was resolved that 600 £10 ordinary shares be issued by the Directors, on such terms as they might deem fit. The dividend on this new capital is to be limited to 7 per cent. per annum. The Secretary, in an exhaustive speech, dealing with the past history, present position, and future prospects of the Company, referred to the new machinery purchased by the Company. He was sanguine that they would find great benefit from it in the saving of labour and material, and, in addition to the statement of the Chairman on the point, he might tell them that whereas they had formerly to pump with two engines 12 hours a day in order to raise a sufficient supply for the town, they had now only to pump with one engine for between 4 and 5 hours daily. With regard to the sufficiency of the present water supply, he (Mr. Case) admitted that in dry seasons it would not suffice for an increasing consumption; but the Company had, he believed, another source which would be all they required, and this only wanted to be properly worked. Some few years ago previously a boring was carried to a great depth with a view to a larger supply, but its progress was impeded by one of the boring-rods falling to a depth of 700 or 800 feet, and being lost. He believed, however, that now coals were cheaper, and they had at their disposal engines which could be devoted to the work, it would be possible to utilize the well. At any rate, they knew the water in it rose above the level of the river, and the Directors were now in communication with Mr. Docwra, with a view of securing a water supply from that service. The Chairman thanked Mr. Case for his interesting speech, and the proceedings closed with the usual vote of thanks.

ACCOUNTS OF THE METROPOLIS GAS COMPANIES FOR THE YEAR 1878.

—	Chartered.	Commercial.	London.	Phœnix.	South Metropolitan.	Surrey Consumers.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	8,726,500 0 0	690,000 0 0	864,014 2 6	1,162,000 0 0	500,000 0 0	290,000 0 0	12,232,514 2 6
Income—viz.:							
Sale of gas by meter	1,774,649 10 5	198,758 7 6	192,758 8 4	252,309 10 5	135,508 11 5	79,903 14 5	2,633,888 2 6
Public lights, including lighting and contracts	128,728 0 5	20,490 10 6	19,478 3 7	25,520 17 6	15,842 18 0	14,922 1 11	224,982 11 11
Meter-rents	35,308 18 9	4,158 6 9	4,224 0 3	5,962 15 11	3,311 16 5	2,138 8 5	55,104 6 6
Old materials	4,542 5 8	328 16 5	334 13 9	1,661 12 11	369 4 11	75 0 0	7,311 13 8
Residual products	469,780 8 3	59,157 14 0	61,208 16 8	77,450 7 9	52,045 6 9	25,469 17 1	745,112 10 6
Miscellaneous	5,739 6 6	835 17 1	3,169 11 6	2,620 15 0	388 4 8	355 1 6	13,108 16 3
Total income from all sources	2,418,748 10 0	283,729 12 3	281,173 14 1	365,525 19 6	207,466 2 2	122,864 3 4	3,679,508 1 4
Expenditure—viz.:							
Coals, including carriage and dues	864,034 4 10	113,779 7 10	104,349 19 5	126,810 18 8	75,884 9 2	44,568 16 2	1,329,427 16 1
Purifying materials, including labour	51,028 17 11	7,092 4 10	2,550 15 11	3,346 3 2	4,154 8 9	2,116 2 5	70,288 13 0
Salaries and wages—manufacture	174,762 6 6	28,125 18 7	24,364 16 7	28,810 1 8	21,082 13 0	12,025 19 8	289,171 16 0
Wear and tear—manufacture	273,201 9 7	18,068 7 8	25,855 13 6	46,258 5 2	11,625 18 4	11,744 7 2	386,754 1 5
Rents, rates and taxes	80,916 18 2	6,374 11 0	10,674 2 7	10,255 15 3	4,896 0 6	4,095 9 7	117,212 17 1
Salaries—management	11,491 15 2	1,551 15 0	2,467 8 2	2,495 17 8	1,597 8 0	1,248 16 0	20,853 0 0
Collectors commission	23,357 1 5	2,140 9 4	3,108 10 11	4,633 13 7	2,406 0 7	1,095 5 1	36,741 0 11
Stationery, printing, and general charges	11,313 1 8	1,699 13 0	1,760 0 5	2,394 14 11	1,290 19 2	949 15 0	19,408 4 2
Directors	7,500 0 0	3,200 0 0	2,500 0 0	3,000 0 0	1,671 0 0	2,000 0 0	19,871 0 0
Auditors	500 0 0	150 0 0	150 0 0	200 0 0	100 0 0	105 0 0	1,205 0 0
Salaries and wages, wear and tear—distribution	127,891 12 0	15,881 8 6	18,174 0 11	22,668 4 3	11,487 17 9	5,695 18 3	201,799 1 8
Repair and renewal of meters	28,873 12 7	1,720 3 1	3,056 8 3	4,401 10 9	1,784 3 7	1,128 7 0	40,964 5 3
Law and parliamentary charges	3,834 5 6	381 18 11	549 14 11	155 4 0	16 15 4	42 3 5	4,980 2 1
Bad debts and extraordinary expenses	28,346 10 10	2,214 12 6	6,931 9 0*	2,674 5 8	1,831 18 2	1,424 16 8†	43,423 12 10
Total expenditure on revenue account	1,687,051 16 2	202,380 10 3	206,493 0 7	258,104 14 9	139,829 12 4	88,240 16 5	2,582,100 10 6
Gross profit	731,696 13 10	81,349 2 0	74,680 13 6	107,421 4 9	67,636 9 10	34,623 6 11	1,097,407 10 10
Do. per cent. on capital and borrowed money	8 7 8	11 15 9	8 12 10	9 4 10	13 10 6	11 18 9	8 19 6
Do. do. gas-rental	38 8 10	37 2 0	35 3 9	38 13 3	44 13 9	36 10 3	38 7 8

* This item includes the sum of £4923 2s. 6d. paid to the Chartered Company for cannel gas supplied in bulk.
† Do. do. £409 4s. 8d. paid to the South Metropolitan Company for common gas supplied in bulk.

TABLE *showing the Capital, Income, Expenditure, and Profit per Ton of Coal carbonized in* 1878.

—	Chartered.	Commercial.	London.	Phœnix.	South Metropolitan.	Surrey Consumers.	Mean of all the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	7 17 5·19	5 0 4·62	6 10 9·48	6 13 3·95	4 12 4·49	5 5 7·41	7 2 7·09
Income—viz.:							
Total gas-rental	1 14 4·06	1 11 10·77	1 12 1·53	1 11 10·38	1 7 11·54	1 14 6·45	1 13 3·90
Meter-rents	7·65	7·26	7·67	8·21	7·34	9·34	7·71
Old materials	0·90	0·57	0·61	2·28	0·82	0·33	1·02
Residual products	8 5·70	8 7·28	9 3·18	8 10·59	9 7·38	9 3·32	8 8·23
Miscellaneous	1·24	1·46	5·76	3·61	0·86	1·55	1·63
Total income from all sources	2 3 7·63	2 1 3·34	2 2 6·75	2 1 11·07	1 18 3·94	2 4 8·99	2 2 10·69
Expenditure—viz.:							
Coals, including carriage and dues	15 7·05	16 6·64	15 9·55	14 6·53	14 0 23	16 2·79	15 5·96
Purifying materials, including labour	11·05	1 0·38	4·63	4·60	9·21	9·25	9·83
Salaries and wages—manufacture	3 1·83	4 1·10	3 8·26	3 3·65	3 10·74	4 4·56	3 4·45
Wear and tear—manufacture	4 11·14	2 7·54	3 10·97	5 3·66	2 1·78	4 3·33	4 6·10
Rents, rates, and taxes	1 5·52	11·13	1 7·39	1 2·12	10·86	1 5·90	1 4·40
Salaries—management	2·49	2·71	4·48	3·44	3·54	5·46	2·92
Collectors commission	5·06	3·74	5·65	6·38	5·33	4·79	5·14
Stationery, printing, and general charges	2·45	2·97	3·20	3·30	2·86	4·15	2·71
Directors	1·62	5·59	4·54	4·13	3·70	8·74	2·78
Auditors	0·11	0·26	0·27	0·27	0·22	0·46	0·16
Salaries and wages, wear and tear—distribution	2 3·69	2 3·72	2 9·01	2 7·20	2 1·47	2 0·90	2 4·23
Repair and renewal of meters	6·25	3·00	5·55	6·06	3·96	4·93	5·73
Law and parliamentary charges	0·83	0·67	1·00	0·21	0·04	0·18	0·70
Bad debts and extraordinary expenses	6·14	3·87	1 0·59	3·68	4·06	6·23	6.07
Total expenditure on revenue account	1 10 5·23	1 9 5·32	1 11 3·09	1 9 7·23	1 5 10·00	1 12 1·67	1 10 1·18
Gross profit	13 2·40	11 10·02	11 3·66	12 3·84	12 5·94	12 7·32	12 9·51

TABLE *showing Increase or Decrease in each Item during* 1878 *compared with* 1877.

—	Chartered.		Commercial.		London.		Phœnix.		South Metropolitan.		Surrey Consumers.		All the Companies.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Capital and borrowed money	326,146	..	..	217	..	165	41,000	..	20,000	..	..	..	386,764	..
Income—viz.:														
Sale of gas by meter	122,054	..	7,359	..	710	..	10,813	..	2,214	..	2,433	..	145,583	..
Public lights, including lighting and contracts	..	778	190	..	..	429	..	158	..	99	510	..	..	764
Meter-rents	1,429	..	1,608	..	110	..	171	..	122	..	46	..	3,486	..
Old materials	445	..	176	..	..	139	376	..	..	95	..	165	598	..
Residual products	..	26,950	3,586	..	..	445	..	3,108	3,201	..	1,007	..	..	22,709
Miscellaneous	386	..	381	..	35	..	126	..	..	31	..	8	888	..
Total income from all sources	96,586	..	13,300	..	..	158	8,220	..	5,312	..	3,823	..	127,082	..
Expenditure—viz.:														
Coals, including carriage and dues	19,203	..	4,237	..	5,707	..	..	450	1,550	..	2,530	..	32,778	..
Purifying materials, including labour	11,309	..	33	..	713	..	575	..	650	..	287	..	13,566	..
Salaries and wages—manufacture	9,109	..	1,371	..	1,004	..	2,087	..	1,816	..	1,216	..	16,602	..
Wear and tear—manufacture	50,151	..	..	4,673	..	1,548	..	6,420	..	1,762	..	3,282	32,466	..
Rents, rates, and taxes	16,620	..	372	..	585	..	601	..	..	3	..	7	18,169	..
Salaries—management	690	..	97	..	70	..	142	..	..	144	100	..	955	..
Collectors commission	..	1,300	1	..	..	49	23	..	101	..	120	..	..	1,105
Stationery, printing, and general charges	..	1,256	104	..	33	..	118	..	..	89	113	..	..	978
Directors	..	..	..	..	525	..	500	..	471	..	..	..	1,496	..
Auditors	..	806	..	100	..	..	100	..	..	..	..	..	..	806
Salaries and wages, wear and tear—distribution	22,596	..	2,247	..	..	336	263	..	785	..	..	2,066	23,490	..
Repair and renewal of meters	..	3,161	..	326	..	58	104	..	..	279	62	..	..	3,658
Law and parliamentary charges	..	6,308	..	57	233	..	..	102	..	27	..	2	..	6,263
Bad debts and extraordinary expenses	..	132	599	..	..	3,923	118	..	80	..	513	..	..	2,745
Total expenditure on revenue account	116,715	..	3,905	..	2,956	..	..	2,341	3,149	..	..	416	123,967	..
Gross profit	20,129	..	9,395	..	..	3,114	10,561	..	2,163	..	4,239	..	3,115	..
Do. per cent. on capital and borrowed money	..	0·56	1·36	..	..	0·36	1·18	..	..	0·12	1·46	..	..	0·26
Do. do. gas-rental	..	3·75	3·11	..	..	1·51	2·41	..	0·82	..	3·44	..	..	1·94

Communicated Article.

ON THE PRODUCTION OF LIQUID HYDROCARBONS FROM WASTE GASES.

By Mr. GREVILLE WILLIAMS, F.R.S.

In the report of the proceedings of the North British Association of Gas Managers in this JOURNAL, No. 848, p. 257, there is contained an important paper by Mr. J. Thomson, of Glasgow, on "A Gas Compressing and Condensing Apparatus." This paper will, probably, form the point of departure of some valuable discoveries in science, and lead up to numerous industrial applications of those exceedingly volatile hydrocarbons which have hitherto scarcely been seen, except in the laboratory of the chemist.

In the discussion which followed, Mr. Young made some remarks which must have been well appreciated by all those who take an interest in this subject. After alluding to the fact that there is evidently a wide attention paid to the recovery of the very volatile hydrocarbons from waste shale gases, and discussing the question of their condensation by means of cold and pressure under certain conditions, he gave it as his opinion that the hydrocarbons can be far more economically and perfectly recovered from the waste shale gases by means of an absorbent oil, as described by him some years ago.

In the "Circular to Gas Companies," in No. 849, p. 232, of this JOURNAL, a regret is expressed that Mr. Thomson did not give a more complete description of these volatile oils, as so many have been tried for enriching coal gas, and have failed from non-evaporation of the material. I apprehend, however, that the oils obtained from the waste gases are certain to have industrial application, even if they should not prove available for the purpose of increasing the illuminating power of gas. Recent discoveries have caused even the less volatile hydrocarbons, which were almost valueless some years ago, to become of great importance.

Mr. Young's remarks upon Mr. Thomson's paper brought to my recollection some hitherto unpublished experiments, made several years ago, which resulted in the conversion of the waste gases obtained in the distillation of the Boghead coal into hydrocarbons having high boiling points and vapour densities. In my papers "On Some of the Products of the Destructive Distillation of Boghead Coal,"* I have shown that the liquid products consist mainly of homologues of olefiant gas, of hydrocarbons having the composition of the alcohol radicals or homologues of marsh gas (now known as the paraffins) and homologues of benzene. Benzene is the first member of the series to which it belongs, and boils at 80° C. = 176° Fahr.; therefore it is evident that the gases escaping from the condensers during the manufacture of photogenic oils can only contain small quantities of that hydrocarbon. The paraffins being especially distinguished for their indifference to chemical reagents, I concluded that, if the gases were treated with sulphuric acid, the resulting products would almost entirely be derived from the various homologues of olefiant gas produced during the distillation. Experiment completely confirmed this view.

For the purpose of effecting an intimate contact between the gases and the sulphuric acid, they required to be shaken together. With this object I had some cylindrical stone bottles made, with a long neck in the middle of the cylinder, and standing at a right angle to it. I then constructed a box, divided into nine compartments, each to hold one of the bottles. The box stood upon friction wheels, and was so connected, by an eccentric, with a steam-engine that it could be moved backwards and forwards two or three hundred times a minute. Each bottle had one pound of concentrated sulphuric acid inserted, and then a stream of the gas was carried to the bottom of the bottle, until the air was expelled, and replaced by the specifically heavier gas. This could be readily ascertained, as, when the bottle was full, the gas, owing to its density and refractive power, could be seen escaping from the neck and pouring down its sides. At this point the bottle was securely corked. When nine bottles were thus charged, they were placed in the compartments in the shaking-box and secured by wedges. After about twenty minutes agitation, it was found, on removing the corks, that strong absorption had taken place, the air rushing in with a loud hissing sound. A further charge of gas was then sent in, and the shaking process was renewed. These alternate chargings and shakings were repeated until the absorption became comparatively feeble, as indicated by the rush of air being scarcely perceptible on removing the corks of the cylinders.

The contents of the nine cylinders having been mixed, a large excess of water was added, and the whole was distilled in a current of steam. The distillate yielded four ounces of oil, which was separated mechanically from the water and distilled. Scarcely anything came over below 149° C. = 300·2° Fahr. The mercury in the thermometer then rose rapidly to 204° C. = 399·2° Fahr. The oil smelt somewhat like the hydrocarbons obtained by distilling the "sludge" in a similar manner, as described by the writer in this JOURNAL, No. 837, p. 794.

These crude hydrocarbons do not entirely dissolve in nitric acid of a specific gravity of 1·4°. Semi-solid nitro compounds are formed, however, which smell like the products of the action of nitric acid on the terpenes. Monohydrated sulphuric acid dissolves the crude hydrocarbons entirely. The mixture is of a pale yellow colour. Caoutchouc swells when covered by the oil, but does not dissolve in the cold. Treated with dry mercuric nitrate, the crude hydrocarbons lose their offensive odour and become delightfully aromatic. Melted potash produces a somewhat similar result, but the odour is not improved to so great an extent.

The dry oil was again rectified, and distillates were obtained from 177° C. = 350·6° Fahr. to 260° C. = 500° Fahr. The portion boiling at 177° C. was burnt with oxide of copper with the usual precautions; it gave:—

Carbon	82·0
Hydrogen	13·3
Oxygen	4·7
	100·0

A portion distilling between 177° and 193° C. = 350·6° to 379·4° Fahr. was cohobated with sodium, again distilled and burnt; it gave:—

Carbon	83·5
Hydrogen	14·6
Oxygen	1·9
	100·0

The smell was greatly improved by the treatment with sodium. The portions distilling between 177° and 216° C. = 350·6° to 420·8° Fahr. were then mixed, three times cohobated over sodium, and distilled over that metal. The action of sodium somewhat lowers the boiling point. On rectification a fraction was obtained boiling between 149° and 177° C. = 300·2° to 350·6° Fahr. On combustion it yielded the following numbers:—

Carbon	83·2
Hydrogen	14·7
Oxygen	2·1
	100·0

It was evident, therefore, that some substance containing oxygen was present and not decomposed by the prolonged action of sodium. The vapour density of a portion distilling between 138° and 149° C. = 280·4° to 300·2° Fahr. was found to be 5·34°. This would correspond to a hydrocarbon of the formula $C_{11}H_{22}$ (C. = 12); but to obtain boiling points corresponding to the known vapour densities of the olefines and their polymers, would require a complete fractional separation, and this was impossible with the quantity of liquid at my disposal.

These results, nevertheless, seem to me clearly to indicate that the homologues of olefiant gas contained in the waste gases, are polymerized by the action of the sulphuric acid, and that the polymers are accompanied by small portions of hydrates of those compounds formed in the manner indicated by Berthelot and others.

I next made an attempt to obtain the liquid hydrocarbons from the waste gases by means of bromine, as I considered, for obvious reasons, that there would be less oxygen in the resulting products. On making a preliminary experiment I found, on passing the gases into bromine covered by a layer of water, that the element was rapidly decolourized. The bromine compound was first treated with alcoholic potash, then cohobated with solid hydrate of potassium, then three times cohobated with sodium, and finally distilled. A product was obtained coming over between 99° and 121° C. = 210·2° to 249·8° Fahr. On analysis it yielded:—

Carbon	85·9
Hydrogen	13·4
Oxygen	0·7
	100 0

The olefines require:—

Carbon	85·7
Hydrogen	14·3
	100·0

The bromine compounds, therefore, as was anticipated, enabled the hydrocarbons to be obtained comparatively free from oxygen, and with much lower boiling points than when the condensation was effected by means of sulphuric acid.

I conclude from the foregoing experiments that if, as there is no doubt, the olefines and their polymers, like all other hydrocarbons, are found to have valuable industrial properties, there will be no difficulty in obtaining them from the waste gases of those inflammable minerals which yield similar products to the Boghead coal.

* *Philosophical Transactions* of the Royal Society. January, 1857, and January, 1858.

WAVERLEY ASSOCIATION OF GAS MANAGERS.—The thirty-seventh half-yearly meeting of this Association was held at Dalkeith on Wednesday last—Mr. James Robb, of Haddington, presiding. Mr. Taylor, Secretary and Treasurer, read the minutes, and gave a report of the funds of the Association, which showed a considerable balance in the hands of the Treasurer. The report was unanimously approved of. Mr. Hall (Berwick) then moved that, considering the very admirable manner in which Mr. Taylor performed the duties of his office, he should be authorized to charge the funds of the Association with his expenses in connection with the half-yearly meetings. The motion was unanimously adopted. Melrose was selected as the next place of meeting, to be held on the second Thursday of April, 1880. A discussion took place as to the best mode of preparing lime for purification, and also on the utility of recalcining foul lime after removal from the purifiers. It was not considered necessary to do so in the district, as several of the members stated that they sold their waste lime for more than its original cost when laid into the works. Several other topics were discussed, prominent amongst which was the proposed amalgamation of the North British and the West of Scotland Associations, and it was ultimately agreed that each individual member should be left free to vote as he saw fit, when the subject was brought up for discussion at the next meeting of the North British Association. The members and friends afterwards sat down to dinner in the Cross Keys Hotel, enjoyed an hour's pleasant conversation, and parted with mutual congratulations on the happy nature of the day's proceedings.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

AITKEN AND YOUNG'S PROCESS—NAPHTHALINE, ETC.

SIR,—I have much pleasure in forwarding you herewith copy of letter received from Mr. Bell, of Gibraltar Gas-Works, which I trust you will favour me by inserting in your first issue.

I think that this letter of Mr. Bell's proves—

1st. That the above process is a complete cure for the naphthaline nuisance. I have stated in your JOURNAL more than once that this would be the result. I should add that the gas is not desiccated, but is simply passed through the Analyzer, descriptions of which have frequently appeared in your JOURNAL.

2nd. The results obtained by Mr. Bell prove that gas, when treated with my process, will carry forward naphthaline into the gas-flame, and there help to increase the illuminating power. This point I previously proved experimentally by passing gas over and through naphthaline after the gas had left the holder.

3rd. Mr. Bell's letter also proves that the statements I have made as to the increased illuminating power that would be obtained with the process, when common coal was worked, are correct.

I think you will agree with me that these results, when looked at either from a scientific or practical point, are very interesting.

Darroch, near Falkirk, Sept. 2, 1879. HENRY AITKEN.

[ENCLOSURE.]

Gas-Works, Gibraltar, Aug. 27, 1879.

Dear Sir,—In reply to your inquiry as to the working of your Analyzer, it gives me great pleasure to report its continued efficiency. Our whole make of gas has passed through it since January last, and up to date it has given us no trouble. As you are aware, I hoped in adopting the Analyzer that it would prove to be a cure for the naphthaline nuisance, and I am happy to state that for the last seven months I have not seen a single scale either in main or service pipe. I may here mention that we have just finished relaying a section of our street-mains. Last summer we laid about the same length, and I then found the internal surface of some of the pipes perfectly covered with large scales of naphthaline, while this year, with the same line of pipe and season, I have failed to get a single scale, even with a reward offered for them.

I have also obtained an increased yield per ton, but regret that I cannot put in figures the increase due to the Analyzer, for this reason, that an exhauster was added to our manufacturing plant about the same time, and I have never worked either of them for any length of time separately. Nevertheless, my firm belief is that at least two-thirds of the increase is due to the Analyzer.

I am happy to say I am in a position to give a more decided opinion with regard to the illuminating power, the increase of which I believe to be solely due to the action of the Analyzer. Formerly I had to use from 6 to 10 per cent. of cannel to enable me to supply 16-candle gas, but after the Analyzer got fairly to work, I had to go on reducing the proportion of cannel until the month of May last, when I stopped it altogether. From that date to this I have not used a single pound.

The following is a correct copy (from my book) of the photometrical results obtained by me during the last four months (Burner: Sugg's Argand):—

April	16·88 candles;	5 per cent. cannel.
May.	18·3 „	No cannel.
June	20·0 „	„
July.	18·29 „	„

(Signed) A. BELL.

A SUGGESTION FOR AN INVENTION.

[Dr. J. Beadnell Gill writes: "Your compositor has, in my letter of the 28th of August, omitted the syllable '*non*' before '*moveable*,' and thereby conveyed to your readers an impression exactly opposite to that which I wished to be conveyed."—ED. J. G. L.]

SIR,—In your last issue, Dr. Gill, of Hastings, says: "The heating powers of steam heated to translucency are unlimited," &c., and, at the same time, gives us to understand that the inventor of means by which such steam could be obtained other than "through the agency of a coal furnace and a non-moveable apparatus," would "confer a vast benefit upon suffering humanity." Well, gas as a source of heat has great advantages, and many who, before now, have read Dr. Gill's letter, know all about what has been done and what can be done with it as a fire, and will be able to give some help in the direction pointed out, if *heating* steam to *translucency* is not very much out of the usual track.

Sept. 6, 1879. W. M.

NEWTOWN AND LLANLLWCHAIARN GAS AND COKE COMPANY.—This Company, which was registered on the 20th ult., proposes to manufacture and supply gas in the town of Newtown and elsewhere in the county of Montgomery, for which purpose it intends to take over the business, property, and liabilities of the Newtown Gas and Coke Company. The capital is £15,000 (with power to increase), divided into 1500 shares of £10 each, of which 250, or any less number, may be issued as A or fully-paid shares, and the remainder as B shares, credited with £7 10s. as paid upon each. The Company may also issue debenture bonds, bills of exchange, promissory notes, or other obligations, and borrow and raise money thereon, or exchange the same for the debentures and other securities of the old Company. The purchase consideration is £11,875, payable in shares, and the payment of the expenses of winding up the old Company.

RUNCORN, WESTON, AND HALTON WATER COMPANY.—The annual meeting of this Company was held on Monday, Aug. 25—Mr. Brundrit in the chair. The statement of accounts showed that the original capital, debenture, and guaranteed stock amounted to £50,999, and £50,921 3s. 1d. had been expended for land, mains, well, reservoirs, buildings, machinery, and plant. The Chairman congratulated the meeting on the improved position of the Company, and proposed that a dividend at the rate of 2½ per cent. per annum, free of income-tax, be paid to the Shareholders. This would absorb £261 4s. 10½d., leave £500 to be placed to the depreciation-fund, and a balance of £313 7s. to be carried to the next half year's account. Mr. T. Banks (Deputy-Chairman) seconded the motion, which was passed. Messrs. J. Simpson and W. Hayes were re-appointed Directors, and Mr. W. Rigby, Auditor. After the passing of votes of thanks to the Chairman the proceedings terminated.

Legal Intelligence.

CROYDON POLICE COURT.—SATURDAY, SEPT. 6.
(*Before Dr.* CARPENTER, *Chairman; Messrs.* J. P. GASSIOTT, T. LLOYD, *and* H. H. HEATH.)

UNLAWFUL USE OF GAS.

William Solly, plumber, gas-fitter, &c., of 13, High Street, South Norwood, was charged by Mr. Charles Gandon, Engineer of the Crystal Palace District Gas Company, with unlawfully connecting a gutta-percha tube with the Company's main, and thus obtaining, surreptitiously, a supply of gas for his own use. The prisoner pleaded guilty.

Mr. H. PARRY appeared for the Company, and said this was a very bad case. The Company suspected that there were similar cases at work, and therefore they were desirous that an example should be made of this case as a caution to others. The defendant was formerly a customer of the Company, and on becoming a defaulter to the extent of £5 12s., or thereabouts, and refusing to pay, the supply of gas was discontinued on the 25th of June. The pipe was cut by the Company's officials, and a cap was placed over the main where the junction had been severed. Gas was afterwards seen to be burning in the defendant's house, and it was discovered at length that the defendant had removed the cap and supplied himself with gas. He was prepared to prove that for 30 days at least the defendant burned the Company's gas in this way. The Act of Parliament fixed the penalty at £5 for illegally connecting with the Company's main, and 40s. per day as long as the connection was continued.

Witnesses having been called in confirmation of Mr. Parry's opening remarks, the defendant said he had called at the Company's offices, with the object of making arrangements for paying a reasonable amount as compensation.

Mr. PARRY: That is something like picking a man's pocket, and after you are found out offering to compensate him.

The *Defendant* said he had no intention to defraud the Company.

The CHAIRMAN: As a plumber and gas-fitter you must have known that you were doing an illegal act.

The *Defendant*: I made no attempt at concealment. The connection was open for any one to see.

The CHAIRMAN: We must convict you, Mr. Solly. The penalty for connection is £5, and you are liable to pay 40s. per day so long as the connection was in existence. We shall impose the full penalty of £5 for the unlawful connection, and a mitigated penalty of 2s. 6d. per day for the 30 days during which it has been proved that the connection continued. The bench fees are 12s., and we shall allow £1 1s. for solicitor's costs, making a total of £10 8s. 6d.

Mr. PARRY applied that, in default of payment, a warrant for distraint might be issued, which was acceded to.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the Composition and Quality of the Metropolitan Waters in August:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.— As Nitrates, &c.	Ammonia. Saline.	Ammonia. Organic.	Hardness (Clark's Scale). Before Boiling.	Hardness (Clark's Scale). After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	20·20	0·120	0·120	0·000	0·011	15·2	5·0
West Middlesex	20·90	0·149	0·120	0·000	0·011	15·7	4·8
Southwark and Vauxhall	20·50	0·109	0·105	0·000	0·006	15·7	4·8
Chelsea	20·00	0·101	0·090	0·000	0·010	14·7	5·4
Lambeth	20·60	0·123	0·135	0·000	0·010	16·3	5·3
Other Companies.							
Kent	29·00	0·028	0·420	0·000	0·002	19·8	5·8
New River	20·20	0·107	0·120	0·000	0·004	15·4	5·0
East London	20·70	0·073	0·111	0·000	0·008	15·2	5·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases.

C. MEYMOTT TIDY, M.B.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Thirty-ninth Quarterly Meeting of this Association was held on Saturday, the 30th of August, at the Gas-Works, Barnsley.

The members met at the railway station, and proceeded by coach to the new gas-works, which were inspected by them. They afterwards drove over a portion of the district by way of Locke Park to the old gas-works, where they held the meeting.

The PRESIDENT (Mr. T. Newbigging, of Manchester) having taken the chair,

The HONORARY SECRETARY (Mr. R. Hunter, of Stalybridge) read the minutes of the previous meeting, which were confirmed.

Mr. John W. Whittaker, Gas Engineer, Wakefield, was proposed and elected a member of the Institution.

PRESIDENT'S ADDRESS.

The PRESIDENT introduced the business of the meeting, as follows:—

Gentlemen,—The Committee decided to hold the present meeting at Barnsley for various reasons. In the first place it was considered that the town of Barnsley was a fitting place for a meeting of gas managers, because it is situated in the very centre of the rich Yorkshire coal-field. Again, it was thought that it would be a convenient centre of access to many of our Yorkshire and other members. And last, but not least, we desired to pay a compliment to our respected member and Past-President, Mr. Hutchinson, by visiting, at his invitation, the Barnsley Company's Gas-Works, of which he is the Manager.

It is not necessary, and, indeed, it would not be becoming in me to address you at any length on this occasion, seeing that we have two excellent papers in prospect, on the subjects of which you will all, doubtless, desire to say something. I will content myself, therefore, with but a few introductory words. We have had a pleasant day for our visit to Barnsley, and it has been gratifying to all of us to have seen the gas-works, both old and new, and to have witnessed the order and neatness that prevail in every department. This is all highly creditable to Mr. Hutchinson, and his son, Mr. Walter Hutchinson, who I believe occupies the position of Assistant Manager to his father; and I may be allowed to express the wish which we all feel, that Mr. Hutchinson may be long spared to fill his present honourable and responsible post.

I am glad to see such a large gathering of members present. Gas managers and engineers are not a very numerous body, and even a stranger would be ready to admit that an Institution which can attract such an array of members from so many different and distant places must have some good points to recommend it. We know that such is actually the truth, and that mutual benefit results from our meetings. Let us see that our association is founded on a broad basis. This accomplished, and each of us holding enlightened views of our duties, the Institution will continue to be a valuable professional aid to the gas managers and engineers of the wide district of which it is the nominal centre.

It is a circumstance on which we may congratulate ourselves, that, notwithstanding the great depression that prevails throughout the country, and especially in the staple trades of our northern counties, the profits made in the manufacture of gas, whether by companies or local authorities, are, on the whole, satisfactory. It is not to be expected that, in these dull times, full dividends can be earned by every company; but, whilst losses in trade are almost universal, gas enterprises are able to maintain a fair position, and divide something amongst their shareholders.

A portion of the credit of such a condition of things must be set down to the general good management that prevails in gas-works. I know of no business in which careful supervision will be more amply repaid by good results than in the manufacture of gas. But the result is due also, in great measure, to the low price at which the raw material of our business can be purchased. Five or six years ago, when cannel and coal were at famine rates, none of us, probably, could have dreamt that prices would, in so short a time, fall to a point lower than they have touched during the present generation. This is very far from being a matter of unalloyed satisfaction, even to gas managers, for it will be one of the surest signs of returning prosperity to the trade and commerce of the country, when the price of coal begins to rise from its present low level.

I am strongly of opinion, however, that we, in our day, whatever the state of trade may be, will scarcely witness a return to the prices of six years ago, when the coal scare reached its climax—for it was in reality a scare, and not a famine. Prior to that time, the question of the duration of our coal-fields was involved in much uncertainty. But few persons had investigated the subject, and the majority of men—even those most interested—were profoundly ignorant of it. It is generally admitted that ignorance is the mother of panic, and to a large extent that it is true in regard to the coal scare and its attendant circumstances.

Again, I have seen it estimated—but how near to the truth I am unable to say—that, stimulated by the high prices, several hundred new coal pits have been opened in this country since the year 1872. We know, as a fact, that whether they amount to hundreds or not, a vast number of new shafts have been sunk; and, although many of these are at present unused, owing to the depression, yet they only await the turn of the tide to be put in operation, and the competition thus introduced will in all likelihood prevent any sudden or excessive rise in prices for a generation—or, at least, until the circumstances of the past few years are obscured or nearly forgotten.

Well, gentlemen, I will not detain you further, but I ask your attention to the papers, both on deeply interesting questions, that will be submitted to you. Mr. W. Hutchinson has devoted much time to gas analyses, and the different apparatus for determining the amount of the sulphur compound; and Mr. Chew is well able, from his long experience and successful working, to handle the important subject of distribution.

Mr. Walter Hutchinson (Barnsley) then read the following paper on

THE SULPHUR COMPOUNDS IN COAL GAS.

The title of the paper which I have the honour of placing before your notice to-day is "A Description of the Various Apparatus used for Determining the Amount of Sulphur Compounds in Coal Gas, and some results obtained thereby." I believe you will allow that such a subject is generally, and with some reason, regarded as an abstruse or tedious one. Still, I think a good and accurate knowledge of the relative efficiency of the instruments used for any given purpose is of great value, inasmuch as that, unless you have an instrument that will show pretty accurately when you have attained any desired degree of purity or efficiency, or how far it is from that point, you will be unable to compare with any other testings recorded, or know for certain when your object is gained.

In the provinces generally, this bone of contention—sulphur compounds and their effects—only rarely crops up, mainly owing to the purification being so efficient, and having considerably less sulphur in the gas than is usually met with in London, where purification by lime is not always admissible, and where large sums of money have been spent in examining into and contesting this very question. I believe it is agreed by most authorities on this subject that the sulphur compounds other than sulphuretted hydrogen are, though not the only item, still in a great measure the cause of the disagreeable feeling which is experienced in a room in which a large quantity of gas is being burnt. It is, therefore, very desirable that we should send out gas as pure as it is possible to make it.

I purpose calling your attention to nine of the different apparatus used for effecting the estimation of sulphur in coal gas, seven of which are exhibited in this room. The first used for this purpose was the apparatus devised by the late Alexander Wright, and may be described as follows—viz., a jet of gas burning about a quarter or half cubic foot per hour over a glass containing, say, 2 ozs. of strong fresh ammonia, mixed with an equal quantity of water, the products of combustion being conveyed through a glass tube about ¾-inch diameter and 34 inches long, which passes, for about 20 inches of its length, through a modified Liebig's condenser, through which is passed a gentle stream of water, regulated so as to maintain a temperature of about 80° or 90° Fahr., a beaker or other glass vessel placed under the outlet of the condenser serving to collect the condensed products.

The advantages of this instrument are that it does not require any aid, such as steam jet, water aspirator, or motive power meter, to produce a current of air to keep the jet alight, the upright glass tube continued through condensers serving that purpose. There is also very little expenditure of time in washing out.

The apparatus may be safely left working over night. The results obtained by its use do not, however, give so high a figure as those obtained by the Referees, but slightly higher than Letheby's system.

The next apparatus that came into use was the one arranged by Dr. Letheby, and was a modification of the apparatus originally used for showing the formation of water from hydrogen gas burned in oxygen. This consists of a Leslie burner consuming about 1 cubic foot, or, as some operators prefer, half a cubic foot per hour, under which is placed a beaker containing about 2 ozs. of strong liquid ammonia, covered by an inverted funnel, the end of which should be put 1 inch higher than the burner, and have a small sheet-iron tube to protect the end. Over the burner comes a glass trumpet tube about 3 inches at bottom, gradually tapering to 1 inch, which conveys the products of combustion into a cylindrical glass vessel, say, 12 inches long by 4½ inches diameter. This cylinder catches the condensable portion, the uncondensable products being allowed to escape up a tube about 3 or 4 feet long and half an inch diameter, bent to a slight angle. Two sizes of the main glass vessel are used, which are stated to give slightly different results. This instrument has an advantage over Wright's in not requiring any water supply either for cooling or otherwise, and was, I believe, first introduced by Dr. Letheby as an improvement on Wright's; but the improvement is very questionable, as most operators will show you that its results are much more variable and not generally so high.

Another form of apparatus is the one devised by Mr. F. J. Evans, who was formerly the Engineer-in-Chief of The Gaslight and Coke Company, London. It consists of a condenser, which is a cylindrical chamber closed both at the bottom and top, save a funnel-shaped inlet for admitting a constant stream of cold water, and an outlet for its exit. In the centre of this chamber a smaller chamber or tube of, say, 2 inches diameter rises, but is contracted at the top (which should be below the water level) into one of much smaller bore, say, about half an inch, which is continued as a spiral worm around the interior of the cylinder until it issues from the bottom. Beneath the cylinder is another chamber, in which is placed a Bunsen burner, directly under the central tube already mentioned, so that all the products of combustion that arise from the consumption of gas within must, perforce, pass up the tubes, and down again through a coil of pipe, all atmospheric air being excluded except that coming through a pipe connected to the lower chamber, and this pipe being connected with a Woulff's bottle charged with a solution of caustic potash, to take out all the sulphurous impurities in the air.

The outlet of this coil of pipe is connected with another Woulff's bottle, filled 1 inch high with a solution of ammonia, sp.gr. 0·880, and this is in its turn connected with a bubbling cylinder. The upper portion of this cylinder above the bulb is filled to within about 4 inches of the top, with small pieces of broken flint glass, some large pieces being placed along the bulb to prevent the smaller pieces falling down it. This cylinder is filled up to half an inch above the contraction with distilled water.

A second Woulff's bottle is attached to the bubbling cylinder. This bottle is empty, and only serves to collect any liquid that may be drawn over the bubbling cylinder by the action of the exhauster which is connected with the outlet of this last bottle. The exhauster is one by which a jet of steam is made to draw a current of air through the whole apparatus to supply the Bunsen burner. Although I have the apparatus and steam jet, I had not a supply of steam in the room in which the other apparatus were placed, and therefore have not as yet experimented with this form.

Valentin's apparatus is stated to give very high results as compared with Letheby's, but rather less than the so-called lime process, which Mr. Valentin describes as the most perfect process.

I had hoped to have procured one of Valentin's apparatus, but find it very difficult to do so, perhaps one reason being that it is not a well-known instrument, and the inventor having recently died. Suffice it, therefore, to say that it consists of a platinum or porcelain combustion tube filled with a platinum wire cage, containing spongy platinum, and partly with soda lime free from sulphuric acid, the principle being to burn the gas in contact with platinum at a high heat maintained by a combustion furnace, and a due supply of air sucked through by an aspirator, the sulphuric acid being dissolved out and estimated in the ordinary way. For a full description of the apparatus and results obtained by it as compared with Dr. Letheby's and the lime process, see the Journal of Gas Lighting, Vol. XVII., 1868, p. 10.

The lime process consists in passing the gas over lime, preferably soda lime, loosely placed in a combustion tube of hard glass, and heated strongly by a gas furnace. It is, however, stated to require much and tedious attention to obtain reliable results.

The Referees process consists substantially in burning the gas from a small steatite Bunsen burner, at the rate of about half a cubic foot per hour. The burner is mounted on a pewter foot, in the form of a short cylindrical box, perforated with holes for admission of air, and having on its upper surface a deep circular channel to receive the wide end of a glass trumpet tube, carrying off the products of combustion into a condenser. The space on the top of the pewter box between the narrow stem of the burner and the surrounding glass trumpet is packed with pieces of commercial sesqui-carbonate of ammonia. By these arrangements the flame is very perfectly protected from draughts, and the products of its burning are formed in presence of a uniformly sufficient, but not at any time excessive quantity of ammonia. The products, both of the combustion of the gas and the gradual volatilization of the ammonia salt, go upwards through the trumpet tube into a vertical glass condenser filled with glass marbles, to break up the current and promote condensation. From the top of the condenser there proceeds a long glass pipe or chimney, serving to effect some further condensation, as well as to produce a draught and afford an exit for the uncondensable gases. From the bottom of the condenser there proceeds a small glass tube, serving to let out the condensed liquid, which is caught in a glass flask or beaker, the amount of sulphur being determined by estimation in the usual manner.

This is now a well-known instrument, and the one in general use in London. It, like Letheby's, does not require a water supply or aspirator, and is considered by many as the most reliable instrument of the series.

Mr. W. Marriott, F.C.S., of Huddersfield, brought out in 1870 an apparatus which he describes as a modification of Dr. Letheby's, but differing in the mode of oxidation—viz., by permanganate of potash, through which the products of combustion are drawn by means of an aspirator. The gas is burned in a Bunsen burner under a trumpet tube, which is connected with a glass globe having an outlet, through which (by a tube) the products of combustion pass to first one, and then another glass jar, each having about 3 inches depth of a solution of permanganate of potash, the products of combustion being made to bubble through by the aspirator. No ammonia or nitric acid is required. About 1½ grains of permanganate of potash are used to every cubic foot of gas burnt; of course, depending on the quantity of sulphur in the gas, two-thirds being put in the first and one-third in the second glass. The globe receiver, interposed between the burner and the first glass jar, is mainly to cool the gases, the second glass jar being principally a precaution, Mr. Marriott having found that, practically, the whole of the sulphur is stopped in the first jar. In estimating the sulphuric acid, the chloride of barium may be added to the permanganate solution, either before or after the combustion of the gas. Some oxide of manganese is always precipitated, but is easily removed by digestion with hydrochloric acid. Mr. Marriott says that on an average of a number of experiments made with his apparatus and Dr. Letheby's, whilst that indicated 8·75 grains, his detected 13·81 grains. (See Journal of Gas Lighting, Oct. 11, 1870, p. 755.) My tests do not show quite so much difference, but this may possibly arise from Mr. Marriott having used the large cylinder of Dr. Letheby's in his experiments, whereas I used the smaller one. I consider that Mr. Marriott's apparatus is a very good one.

Whilst trying a few experiments with Marriott's apparatus the thought occurred that by combining his system of oxidation with a supply of purified air—it being stated on the authority of Dr. Angus Smith and Mr. Vernon Harcourt, that there is a sensible amount of sulphurous acid in the air of large towns which would affect any test for sulphur conducted without purifying the air—I should get a nearly perfect instrument. I

therefore contrived a modified Marriott's apparatus, such as you see here, the current of air being drawn through a solution of permanganate of potash, or caustic potash, and then passing into the trumpet tube, under which stands a small Bunsen burner; the trumpet tube dropping into a concentric circular channel in a block of wood (or any suitable material), half an inch deep, the channel having mercury in to seal off the air, the rest of the apparatus being the same as previously described. The few experiments I have made with the apparatus indicate an average of 8·86 grains, as against 9·53; but whether this really arises from purifying the air, or from some other cause, I am not yet prepared to say. I give the figures below—

No. of Test	Marriott's.	Marriott's, with Purified Air.
2	7·61	6·61
3	9·43	8·63
4	8·47	8·43
9	12·63	11·79
	4)38·14	4)35·46
	9·53	8·86

The aspirator used for working the last two forms of apparatus consists of a half-inch wrought-iron pipe placed perpendicularly, about 10 feet long, closed at the top, and having on each side a ⅜-in. branch, one for water supply (from the town mains), which is, say, 9 inches from the closed end, and one for the air, say, only 3 inches from the closed end. The objection to the last two apparatus, as indeed all where an aspirator is used, is that unless you have a quite constant supply of water the lights are apt to go out and spoil the test; therefore, you must be in attendance if you cannot depend on the water supply.

Mr. A. Vernon Harcourt's colour-test for ascertaining the amount of bisulphide of carbon in coal gas is an exceedingly handy and valuable instrument, for by its use the quantity of that compound can be ascertained in a very few minutes. The principle of it is heating the gas in contact with platinized pumice to a moderate degree of heat (somewhat similar to the Rev. Mr. Bowditch's process for extraction of bisulphide of carbon), thereby breaking up the bisulphide of carbon into sulphuretted hydrogen gas, &c., which, when passed through the test-glass containing lead solution, is arrested, and the solution is consequently discoloured, the proper point of discolouration being ascertained by comparison with the standard test-glasses sent out with the apparatus, one being used during daylight, and the other by gaslight. It is a handy instrument, and one the value of which is great for ascertaining the relative efficiency of the various apparatus, such as scrubber, purifiers, &c., for extracting carbon bisulphide. I believe this instrument records very faithfully the amount of carbon bisulphide, the only drawback being that it only detects the substances just mentioned, and does not in any way touch those other sulphur compounds or sulphuretted hydrocarbons, the particular nature of which is not yet exactly defined.

For the comparisons that I have instituted, it is not of so much use, seeing the total sulphur compounds were so low in the gas tested that, by its use, you have an estimated quantity of 7 or 8 grains, out of 8 or 10 total quantity. It is, however, the best test for general use in a gas-works that I am acquainted with, and the only one which is clear of the tedious estimation of sulphuric acid in the gravimetric way, and in usefulness may be compared with Sugg's illuminating power meter.

Lest I should weary you with descriptions of apparatus, I will now proceed to say that, having ascertained that the respective meters were correct, and that all the chemicals, chemical solution, &c., used in the various tests, and for estimating the sulphuric acid arrested, were absolutely free from sulphur in any shape, I made the experiments the results of which I give you below. The gas being contained in a holder (50 ft. capacity), I was assured that its quality remained constant during each test—a point worthy of consideration, when we know that at times gas suddenly, from no perceptible reason, contains much more sulphur than at others. The whole of the apparatus was contained in one room, was at the same temperature, and was some distance away from any works, gas or otherwise, and on the third storey. The air would, I consider, be purer than is usual where this class of tests are made.

In table No. 1 are given the rates of burning, and the result in grains of sulphur. In table No. 2, the result only, for easy comparison.

Table No. 1.

No. of Test.	Referees.		Letheby's.		Wright's.		Marriott's.		Marriott's, with Purified Air.		Harcourt's.	
	Cubic Feet of Gas burned per Hour.	Grs. of Sulphur in 100 Cubic Feet of Gas.	Cubic Feet of Gas burned per Hour.	Grs. of Sulphur in 100 Cubic Feet of Gas.	Cubic Feet of Gas burned per Hour.	Grs. of Sulphur in 100 Cubic Feet of Gas.	Cubic Feet of Gas burned per Hour.	Grs. of Sulphur in 100 Cubic Feet of Gas.	Cubic Feet of Gas burned per Hour.	Grs. of Sulphur in 100 Cubic Feet of Gas.	Number of Measures of Water.	Grs. of Sulphur in 100 Cubic Feet of Gas (7 added).
1	·43	8·67	·72	6·16	·23	6·40	·76	8·22	—	—	—	—
2	·43	8 79	·82	6·72	·25	5·11	·75	7·61	·84	6·61	215	9·32
3	·46	—	·82	7·05	·27	7·03	·74	9·43	·80	8 63	200	9·50
4	·39	9·00	·81	7·09	·26	7·83	·87	8·47	·82	8·43	—	—
5	·40	8·43	·85	7·61	—	—	—	—	—	—	—	—
6	·41	8·05	—	7·10	·28	6·54	·66	7·86	—	—	—	—
7	·47	10·34	·80	7·83	·28	8·67	·66	8·82	—	—	240	9 08
8	·51	10·09	·76	6·79	·28	7·63	—	—	·69	7·53	250	9·00
9	·37	—	·77	7·32	·37	8·81	·65	12·63	·64	11·79	200	9·50

Table No. 2.

No. of Test.	Referees.	Letheby's.	Wright's.	Marriott's.	Marriott's, with Purified Air.	Harcourt's.
	Grains of Sulphur in 100 Cubic Feet of Gas.	Grains of Sulphur in 100 Cubic Feet of Gas.	Grains of Sulphur in 100 Cubic Feet of Gas.	Grains of Sulphur in 100 Cubic Feet of Gas.	Grains of Sulphur in 100 Cubic Feet of Gas.	Grains of Sulphur in 100 Cubic Feet of Gas (7 added).
1	8·67	6·16	6·40	8·22	—	—
2	8·79	6·72	5·11	7·61	6·61	9·32
3	—	7·05	7·03	9·43	8·63	9·50
4	9·00	7·09	7 83	8 47	8·43	—
5	8·43	7 61	—	—	—	—
6	8·05	7·10	6 54	7·86	—	—
7	10·34	7·83	8·67	8·82	—	9·08
8	10·09	6·79	7·63	—	7·53	9·00
9	—	7·32	8 81	12·63	11·79	9·50

Now, if you select from Table No. 2 the simultaneous tests by the Referees, Letheby's and Wright's apparatus, viz.:—

No. of Test.	Referees.	Letheby's.	Wright's.
1	8·67	6·16	6·40
2	8·79	6·72	5·11
4	9·00	7·09	7·83
6	8·05	7·10	6·54
7	10·34	7·83	8·67
8	10·09	6·79	7·63
	6)54·94	6)41·69	6)42·18
	9·15	6·95	7·03

you will find that the Referees are in excess of Letheby's by 2·20 grains, or 32 per cent., and that the indications of Wright's are slightly in excess of Letheby's.

I notice that Mr. J. Pattinson, Gas Examiner to the Newcastle-on-Tyne Town Council, was conducting a series of experiments on this subject, and read a paper on Oct. 5, 1878, before the North of England Gas Managers Association, in which he states that he finds the Referees test 36 per cent. in excess of Letheby's, and that Wright's gives higher results than Letheby's—the Letheby he used being the large kind. If 7 be taken as the number to add in Harcourt's test, I consider the mean result in these tests by that instrument to be 9·25 grains. Again, if you select the tests made simultaneously with the Referees, Letheby's, Wright's, and Marriott's apparatus, you have—

No. of Test.	Referees.	Letheby's.	Wright's.	Marriott's.
2	8·79	6·72	5·11	7·61
1	8·67	6·16	6·40	8·22
4	9·00	7·09	7·83	8·47
6	8·05	7·10	6·54	7·86
7	10·34	7·83	8·67	8·82
	5)44·85	5)34·90	5)34·55	5)40·98
	8·97	6·98	6·91	8·19

From which you will perceive that Marriott's test shows only a slightly less percentage than the Referees, which indicates the highest result of any. I need scarcely add that the gas experimented upon was supplied by the Barnsley Gas Company, and was purified in the usual manner by lime. Amongst other matters shown it is not easy to overlook the fact that practically we are able to extract all but a very small quantity of carbon bisulphide; but with regard to the other sulphur compounds, we appear at present to possess no practical means of completely getting rid of them.

Before I conclude, I beg to say my thanks are due to Mr. Burgess, of Huddersfield, and Mr. Goodwin, of Rotherham, for the loan of Marriott's and Letheby's apparatus.

The President having invited discussion,

Mr. R. Hunter (Stalybridge) expressed the pleasure he had experienced in listening to the paper. He could not say what amount of sulphur was in the gas supplied by his Company, as he had at present no means of testing for the sulphur compounds. The gas was sent out free from sulphuretted hydrogen, and as free from sulphur in other forms as his circumstances would permit. He agreed with Mr. Hutchinson in the feasibility of a system of purification by which almost every particle of bisulphide of carbon would be extracted from coal gas.

Mr. Barrett (Manchester) said the apparatus used in Manchester was different from any of those exhibited and described, and was devised by their own Consulting Chemist. The results generally were about similar to those given by other testing apparatus, and they found about 20 grains of sulphur per 100 cubic feet of gas, which he did not consider was a very excessive quantity.

Mr. Carr (Halifax) understood Mr. Hutchinson to say that there was less sulphur in the gas supplied in the provinces than in that supplied by the London Gas Companies, from the fact, as he stated, that more lime was used in the purification. His (Mr. Carr's) experience was that, in the provinces, the gas was not so pure as that supplied in the Metropolis. Lime undoubtedly took out sulphuretted hydrogen, even as used in provincial gas-works, but unless used scientifically would not affect the other sulphur compounds. The question of the sulphur compounds in coal gas was not understood even by the best chemists. None of the results given by these several tests were scientifically accurate, and to a great extent all were working in the dark. He would be glad to know whether Mr. Hutchinson had made simultaneous experiments with the same gas by the various apparatus, and, if so, how the results compared one with the other? With regard to Vernon Harcourt's colour test, it was the most convenient test, but the objection was raised to it that it was not sufficiently accurate. The apparatus which showed the greatest amount of sulphur in the same gas must be considered the best and most searching, and he believed that result was obtained by the Referees apparatus. In conclusion, he thought that if the gas was kept free from sulphuretted hydrogen the little sulphur remaining would do no harm.

Mr. W. Littlewood (Manchester) said he had not much to contribute to the discussion on the paper, as he had not an extensive experience of bisulphide of carbon, or other less known sulphur compounds in coal gas. The apparatus which he had used, of which there was not a specimen on the table, was one invented by Dr. Leigh, the Consulting Chemist of the Manchester Corporation. In this the gas was consumed in a large bell jar, and by means of an exhauster or aspirator, the products of combustion were drawn through a solution of carbonate of ammonia. The condensed liquor was then treated with a solution of nitrate of baryta, the sulphur being precipitated in the form of sulphate of baryta, and from the amount of this the quantity of sulphur present in the gas was calculated.

The President expressed his high appreciation of Mr. Vernon Harcourt's colour test, which he looked upon as the invention of a thorough chemist, and as one of the most useful apparatus in the gas managers laboratory. Although it did not give a positive indication of the whole of the sulphur present in the gas, yet, by the addition of the hypothetical number, the result was near enough for all practical purposes, and then its handy form, and the celerity with which by its use a determination could be made, were greatly in its favour. As regarded Wright's apparatus, he should always, notwithstanding its defects, view it with a good deal of kindly favour, seeing that it was the first apparatus devised for this purpose, and that too by one of their own profession—a gas engineer. For ascertaining the whole of the sulphur present in purified gas he considered the Referees apparatus as the best, as well as the most easily managed. He scarcely agreed with Mr. Carr that we were working in the dark in respect to the use of these various apparatus and the conclusions to which they led us, as the very equable results obtained from week to week by the London gas examiners showed that the tests were sufficiently trustworthy. On the general question he remarked that sulphur was the gas manager's "old man of the sea." It existed in coal of every kind; in cannel as free sulphur, and in ordinary coal as pyrites or bisulphide of iron, and when

the coal was being distilled in the retorts for the production of the gas, the sulphur combined with the other elements that were present, forming various compounds that were highly objectionable from a gas consumers point of view. The most disagreeable of these, the sulphuretted hydrogen, fortunately, there was no difficulty in removing; but the bisulphide of carbon, and the other not very well known sulpho-carbon compounds, were not so easily dealt with. There was an astonishing variation, too, in the quantity of sulphur present in the gas produced from the same class of coal at different times, which was not always easy to account for. Undoubtedly the degree of heat of the retorts had much to do with the formation of the sulphur compounds. One of the chief conditions, in his opinion, of a low sulphur average in ordinary working, was the use of lime, in purifiers of large area in proportion to the make. Indeed, in purification generally, if economy and efficiency were to be considered, time was an element that must not be overlooked. The mere passing of the gas through the purifying media was not sufficient to ensure good results; time must be given for chemical affinity to operate, and, paradoxical as it might seem, the smaller the proportion of impurity present in the gas the longer the time required for its elimination, or absorption, by the purifying material. Then, again, it was well known that efficient washing and scrubbing arrangements greatly assisted in keeping down the sulphur average. Washing the gas with ammoniacal liquor, before finishing with clean water, was especially to be recommended, not only for its efficacy in removing this particular impurity, but also because it removed a large proportion of the other objectionable compounds, and was an economical and philosophical method of purification. He concluded by moving a vote of thanks to Mr. Hutchinson for his paper.

Mr. Carr seconded the motion, and with reference to his remark that gas managers were working in the dark, said he meant with respect to testing for sulphur; and as precisely the same results could not be obtained twice by the same apparatus in dealing with the same gas, it followed that the tests were not scientifically accurate.

The motion was carried unanimously.

Mr. Hutchinson, in reply, said that he was much obliged for the way in which his attempt had been received. Referring to Mr. Carr's remarks, he was convinced that with some of the instruments he could get the same results, or at least near enough to be practically the same, many times over. The average of five simultaneous tests gave the following results:—Referees, 6·86 grains; Letheby's, 6·98 grains; Wright's, 6·91 grains; and Marriott's, 8·19 grains. These were all made with the gas contained in one small holder, and under similar circumstances.

[The second paper read was one by Mr. John Chew, of Blackpool, entitled "The Distributing Apparatus from the Gasholder to the Consumer's Burner;" and this we shall publish next week.]

THE EXPLOSION AT THE CONGLETON CORPORATION GAS-WORKS.

In reference to the paragraph which appeared in last week's Journal under the above heading, we have been favoured by the Manager of the works (Mr. Adam Cooke) with some additional particulars, which seem entirely to explain the cause of the accident, besides correcting certain inaccuracies.

The holder which collapsed was the smaller of the two at the works, and was erected some 24 years ago. It was capable of storing 30,000 feet of gas. It is supposed that the stoker in charge left the valve of the larger holder partly open (it was found so when Mr. Cooke reached the works), and by this means overfilled the small holder, causing it to blow. The escaping gas was carried to the purifying house, close by, and, filling the roof, was ignited by a small jet that was burning at the time. This light was fixed over the closet, and was 15 yards from the purifiers. The explosion thus caused did considerable damage to the roof, but all the purifiers escaped uninjured, except one upon which some slates fell, and bounced the test plug out. This, however, one of the men replaced with a lump of clay. The concussion from the explosion caused the gasholder to turn on one side, and the escaping gas burnt itself out. The holder is very little damaged, save where the side sheets caught the coping stones of the tank when it overturned. All the columns are broken, but as these were bolted down in new red sandstone with rag bolts 4 inches long, and run in with lead, it is no wonder that the concussion from the explosion in the purifying-house should send the holder over, considering the length of the holding-down bolts (which ought to have been at least 4 feet long) and the nature of the stone, which can be broken in the hand as easily as a piece of bread. The damage to the purifying-house roof is a trifling matter. As to windows in the neighbourhood of the works which were reported as being shattered, Mr. Cooke states that there are only four squares of glass broken, while the station-meter house, which is two yards from the holder and joins the purifying house, has a glass roof and door, every pane of which is perfectly whole.

Another correspondent says: It has been ascertained that the accident at the Congleton Gas-Works, which was briefly commented upon in last week's issue of the Journal, was inaccurately described in the first newspaper reports of the occurrence. The damage to surrounding property is very much less than was stated, consisting, outside the actual scene of the explosion, of merely a few panes of glass in one or two of the nearest windows. It has also been found that the gasholder itself never exploded, in the true and ordinary acceptance of the term, but having been overfilled, and its tank also overflowing, volumes of gas from its uplifted side found their way into an adjoining purifying shed, where, coming in contact with a light, which seems to have been most improperly left burning all night, an explosion followed which wrecked the shed, and partially unroofed an adjoining meter-house. Possibly, by the force of the shock, the gasholder, which was about 25 years old and of weak construction, capsized in the tank, and its contents burnt quietly out. Matters appear to have been still further complicated by the ignition of gas from a testing-plug of one of the purifiers which had been jarred out of place by the fall of some of the roof timbers on it. Eventually the flames were extinguished, and the damage, although severe in the case of the holder—which was completely destroyed as regards working value—and the purifying-shed, was found to be confined to them, with the trifling exceptions above mentioned. As might be expected, great excitement prevailed at the time of the fire, and some fears were entertained by the general public that another holder might have been injured; but such was not the case, and the supply of gas has been continued without further interruption. Strict inquiry is being made by the Corporation, who are the owners of the works, as to the person, if any, to whom blame is to be imputed; and it is to be hoped, for the sake of the peace of mind not only of the ratepayers and inhabitants of Congleton, but of all who have any interest or connection with gas-works, that this part of the affair may be thoroughly established on a basis of fact, and not remain as an inscrutable mystery to disturb the public mind by a revival of that distrust of gas on the score of indefinable danger which has in time past acted so banefully, and only in these latter days has in a great measure subsided before the confidence born of knowledge and familiarity.

BROMLEY GAS CONSUMERS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held on Thursday, Aug. 28—Mr. R. Latter in the chair.

The Secretary and Manager (Mr. G. H. Osborn) read the notice convening the meeting, and the following report was presented:—

The profit made in the half year's working is such as to justify, in the opinion of the Board, the declaration of a dividend at the usual rates—viz., 10 per cent. per annum on the old capital, and 7 per cent. on the new capital, which will require £3166 13s. 4d., leaving £66 16s. 9d. to be carried forward to the profit and loss account for the current half year. The narrow margin thus left above the amount necessary to provide the statutory dividend on the increased capital expenditure (as yet partially unproductive) proves that the small increase in the price of gas, to which the Directors resorted in the spring, was necessary under the circumstances.

The Directors have to report that the Royal Assent was given on the 3rd of July to the Act promoted by the Company, authorizing the raising of additional capital to the extent of £100,000, by the creation of new ordinary shares or stock, and to the further extent of £25,000 by borrowing.

By this Act the Company become liable to the provisions of the Gas-Works Clauses Act, 1871, which involves alteration in the form of their accounts, and other important alterations, both as regards the issue of the new shares, and the amount which may be charged for gas and paid for dividend. In the first place, all the new shares or stock must now be offered for sale by public auction or tender; the purchase-money, including any premium that may be realized, to be paid within twelve months after the sale; and not more than £20,000 to be raised in any one year. Secondly, although the maximum dividend on the existing capital of the Company remains the same, that on the new ordinary shares or stock is limited to 7 per cent., subject, however, as regards the entire capital, to the sliding scale after mentioned.

The standard price to be charged for gas is to be 4s. 6d. per 1000 cubic feet, instead of the present maximum of 5s., with a proviso that the Company may increase or diminish such standard price, subject to a decrease or increase in the standard rates of dividend, to be calculated as follows:—For every 1d. charged more or less than 4s. 6d. in any year the standard rate of dividend is to be reduced or increased by 5s. per cent. per annum.

Under this new system, your Directors confidently hope that before long both the Shareholders and the public will reap substantial advantages.

The extensive additions and alterations to the works which have been rendered necessary by the increase of the district are now approaching completion, and, for the most part, will be in use during the ensuing winter season. The Directors have some hopes that the railway siding will be completed before long, the Railway Company having obtained powers in the last session of Parliament which will facilitate its construction.

To complete the new works it will be necessary during the present year to raise a portion of the newly-authorized capital, and, accordingly, resolutions will be proposed, authorizing the issue of shares sufficient to raise an amount not exceeding £10,000 and their sale by public auction, in pursuance of the powers of the Act.

[The capital of the Company consists of £50,000 in £10 shares, entitled to 10 per cent. dividend; £20,000 limited to 7 per cent.; and debenture bonds to the value of £17,500, issued at 4, 4½, and 5 per cent. The total expenditure on capital account to Dec. 31, 1878, was £80,425; expended in the half year ending June 30, 1879, £5207—total, £85,632, leaving a balance of capital account of £1867.]

Revenue Account, for the Six Months ending June 30, 1879.

Expenditure.

To Manufacture of gas—			
Coals, including all expenses	£4,034 17 7		
Purifying materials	76 13 10		
Wages and gratuities	752 11 7		
Works, machines, and retorts—maintenance of, repairs, and labour	361 6 0		
		£5,225	9 0
Distribution of gas—			
Meters, repairing and renewing		9	4 6
Public lamps—			
Lighting and repairing		164	1 10
Rates and taxes		56	6 8
Management—			
Directors allowances	£250 0 0		
Salaries of Secretary and Manager, Clerks and Collector	687 0 0		
Stationery and printing	27 6 7		
General establishment charges	65 8 3		
Auditors	21 0 0		
		1,050	14 10
Sundries—			
Bad debts and allowances		26	4 5
Horses and carts		40	0 0
		£6,572	1 3
Balance carried to profit and loss account		3,608	15 4
		£10,180	16 7

Receipts.

By Sale of gas—			
March quarter.			
Private rental—22,479,000 cubic feet, at 4s.	£4,496 4 1		
Public rental	449 5 3		
		£4,945	9 4
June quarter.			
Private rental—11,129,000 cubic feet, at 4s. 2d.	£2,318 12 6		
Public rental	206 7 4		
		2,524	19 10
		£7,470	9 2
Meter rental—the half year		155	1 6
Residual products—			
Coke, less cartage	£1,636 15 1		
Breeze, less cartage	67 9 8		
Tar, less cartage	197 9 8		
Sulphate of ammonia	533 4 11		
		2,434	19 4
Rents		42	18 0
Fitting account		73	0 7
Rental of fittings		3	5 6
Transfer fees		1	2 6
		£10,180	16 7

The Chairman moved the adoption of the report. He congratulated the Shareholders upon the successful carrying through Parliament of their Bill authorizing the creation of additional capital, and so enabling them to keep pace with the increasing demands upon them for gas. One of the objects of the meeting was to declare a dividend at the usual rate of 10 per cent. upon the old shares, and 7 per cent. upon the new ones, and he was happy to say that the sum necessary to pay this dividend had been fairly earned within the half year, notwithstanding that a portion of the new capital was as yet unproductive. The increase of interest to be paid this half was 17 per cent. in excess of the corresponding half of last year, although that half showed an advance of 12 per cent. on its predecessor, and from these facts would be seen how rapid was the increase in the business of the Company. This increase led him to believe that the new works just completed would not be sufficient to keep pace with the demands for many years, and that it would be necessary to come again to the Shareholders at no very distant date for authority to raise even more additional capital in order to augment and extend the works. By their new Act, the old state of things, which limited the maximum amount of dividend to 10 per cent., was somewhat altered, as they had availed themselves in it of the power to fix a maximum charge of 4s. 6d. per 1000 feet of gas, and in proportion as they supplied below that figure so would they be enabled, if the earnings of the Company admitted of its being done, to increase the dividends in like proportion to the Shareholders over and above the 10 per cent. on the old and 7 per cent. on the new capital. This

would make it mutually a benefit to the consumers and to the Shareholders to supply gas at a cheap rate, especially as the dividends would be reduced 5s. per £100 for every 1d. charged in excess of 4s. 6d. per 1000 feet to the consumers. Such a thing, however, was hardly within the bounds of possibility. He hoped, without making any rash promises, they would be able to reduce the price again very shortly to 4s. per 1000 feet, and still be able to maintain existing dividends.

Mr. J. W. ILOTT seconded the adoption of the report and the declaration of the dividends.

Mr. CABBAN asked why the price of gas had been raised from 4s. to 4s. 2d. per 1000 feet.

The CHAIRMAN said they did so because there was such a large amount of new capital unproductive, and the Directors were afraid that the earnings at 4s. per 1000 feet would not have been sufficient to pay statutory dividends. The increased rental last half year upon the extra 2d. per 1000 feet had only been £90, but next half it would yield £400 or £500.

Mr. CABBAN said he only asked for information, because they all knew how cheap coals had been, and to him there appeared no ground for the increase in price. He thought they should have sacrificed some of their dividends in the interests of their customers, rather than have raised the price, because they were in the same position as an ordinary trader who did not increase his prices because he enlarged his premises, but trusted to doing a larger business by reason of his outlay.

The CHAIRMAN said the previous speaker fell into the same error as other people had done before, in taking the price of coals as the basis for the price of gas, the fact being that it had very little to do with it, because interest on the money sunk in plant was not taken into account, and that amounted to very much more than the mere cost of coals and the production of gas. He contended that it was only fair and reasonable in an undertaking of this kind, hemmed in as it was with all sorts of restrictions, that they should, if possible, pay the full dividend allowed by statute.

Mr. WILDE said the Directors were somewhat divided as to the policy of reducing the price of gas to 4s. per 1000 feet, and he believed it was a mistake to do so.

The resolution was then put and carried unanimously, and the balance of £66 10s. 9d. was ordered to be carried forward.

The CHAIRMAN moved that authority be given to the Directors to raise £10,000 additional capital by the sale of shares to cover that amount, such shares to be sold by public auction, and to bear interest at the rate of 7 per cent. per annum.

Mr. S. P. ACTON seconded the motion, which was carried unanimously, and a vote of thanks to the Chairman brought the proceedings to a close.

LANCASTER GAS COMPANY.

The Fifty-Third Annual Meeting of this Company was held on Wednesday, Aug. 27—Mr. W. ROPER in the chair.

The SECRETARY and MANAGER (Mr. W. Fleming) read the following report:—

The accounts for the past year, which have been duly audited, show a balance to the credit of revenue account of £4747 14s. 10d. This, with the balance in hand from last year, amounting to £222 9s. 7d., gives a sum of £4970 4s. 5d. available for disposal, and enables your Directors to recommend a dividend for the year at the maximum rate of 10 per cent. (less income-tax), and to carry forward a balance of £2032 14s. 5d.

The capital and borrowing powers of the Company under the Act of 1856 being exhausted, the Directors were under the necessity of applying to Parliament for further powers. By an Act obtained in the last session, the Company is empowered to increase its capital by the sum of £66,400, the dividend on which is limited to 7 per cent., and to borrow a further sum of £16,600, making the total capital of the Company £120,000.

During the progress of the Bill the Corporation of Lancaster entered into negotiations with your Directors, with a view to the purchase of the works and property of the Company by the Town. These negotiations, which were conducted by the Committee appointed by the Corporation in a most friendly spirit, resulted in the transfer of the property of the Company to the Corporation, on the terms approved by the Shareholders at an extraordinary meeting held on the 26th of May last. Under the provisions of the agreement, the concern is now being worked for the benefit of the Corporation.

The Directors desire to record with regret the death of their late Chairman, Edward Denis de Vitre, Esq., and of their Deputy-Chairman, James Stockdale Harrison, Esq. The loss of their services, which they always rendered most readily to the Company, has been particularly felt in the progress of the recent Bill through its various stages, and during the negotiations which ended in the transfer of the property to the Corporation.

The Directors propose, in order to perpetuate the memory of their late Chairman, Dr. Denis de Vitre, and as a memorial of the long, and valuable services which he rendered to the Company, to present to the town a drinking-fountain and lamp-pillar, to be erected in the Market-place. For this purpose a sufficient sum has been charged upon the accounts of the past year.

The CHAIRMAN said it would perhaps be as well that he should offer one or two remarks, at this, which was in all probability, their last meeting for dividend purposes; but, at the same time, whilst sorry that it should be the last meeting for such a purpose, he might congratulate the Shareholders upon the exceedingly prosperous state of the concern. In that, their last stage of existence, they had made during the past year a larger amount of profit than in any preceding year, so that they went out of existence with a very good grace. They were not bankrupts, or likely to be, and if it should so happen that the Corporation did not carry out in its entirety the arrangement made with them, the Directors would be happy to continue as Directors, and no doubt those present would be equally happy to remain as Shareholders in so prosperous a concern. During the past year the sale of gas had increased, and also the residual products. At the same time the residuals, owing to the stagnation in trade, had not fetched so high a price as during the previous year, but the sale of gas had increased materially. This year they would have something like £450 as the increase from the sale of gas. In addition to the profit of £4700, £1800 had been set apart for reserve-funds. The cottage renewal, sustentation, and reserve-fund, had received £1800, so that he thought no one could grumble in any way at the amount of profit made, unless some one might say that, with these extraordinary profits, the price of gas should be reduced. He might say that last August a paragraph was inserted in the report to the effect that they would reduce the price to private consumers, but on consulting their Engineer as to the advisability of so doing, he said under the circumstances—those circumstances being an application to Parliament for a new Act—they should not make any reduction, and consequently no alteration had been made. This year they were powerless, and it now remained with the Corporation to make a reduction if they thought fit. He believed that by a sale of gas of good quality and at a fair price, a much increased sale would be effected, and a larger consumption would take place. They had during the past year to make themselves acquainted with the fact of Mr. Edison's invention of the electric light. At that time a great scare was caused amongst gas companies, and he knew that a great amount of distress had been caused in large towns by that particular scare. Many persons of reduced means were led to think that gas companies were going to ruin, and sold their shares at a great sacrifice. He knew of several cases of this sort, and felt exceedingly sorry for them. In their Company, he was happy to state, not one single transfer from this cause took place. It was not worth while, perhaps, going into the electric light question, more than to say that having a Bill in Parliament for other purposes, the Directors thought it due to the Shareholders, and to the concern generally, to include certain clauses with reference to the electric light for their own protection, as they merely wished to be placed on the same footing as other people. They had been a lighting company for many years, and they did not wish to be denuded of that right. He was glad to say that they had obtained their Act, by which they had power to increase the capital by £83,000. But what, perhaps, was better, they had obtained powers under the 16th clause as follows:—"The Company, as they from time to time may think fit, may manufacture, purchase, provide, supply, sell, let for hire, use, and otherwise deal in gas and other fittings, engines, stoves, ranges, pipes, and other apparatus and appliances, for lighting, for motive power, for the warming and ventilating of houses and buildings, the cooking of food, and for all other purposes for which gas can or may be used." That was a very extensive clause, and by it very extensive powers had been conferred on them. Those powers had now to be worked out by the Corporation, and he had very little doubt they would result in an increase in the sale and consumption of gas. This would be found a very important clause for the Corporation in taking the concern from them. They had also obtained powers to take additional land. It was very desirable to have a little land in case they should want to extend the works. By the powers named they could purchase sufficient land to enable them to double their retort-house, and also put down three gasholders on one side of the railway, and one on the other, as occasion might require. At the present moment, he believed, they were very short of storeage room, and it would become a question with the Corporation at what time—it must be within a reasonable time—they would increase it. Land was a very desirable acquisition to have, and it was also very essential to have it in close proximity to the works. Another arrangement they had made was with the Railway Company, whereby coal would be delivered at the works at the same price as it was delivered at the station. Under their Act they had power to construct sidings, and that would be a great advantage. The acquisition of all these powers had been obtained at a cost of £2500—he believed the amount was £1 short of that sum. This sum was set apart as the cost of their proceedings in Parliament, so that it would be seen they had calculated very closely and within the estimate. He believed in about twelve months time they would have to call the Shareholders together for the purpose of winding up the concern. After all the expenses were paid, and they knew exactly how they stood, they would have to bring forward some scheme for compensating officers in various ways, and for the division of the balance that might be in hand. This was likely to amount to from £4000 to £4500. The Corporation would very shortly have to consider the mode of purchasing the works or, rather, how they meant to pay for them, and they would, no doubt, be prepared with a scheme to offer to the Shareholders of the Company, whereby they might have the option of being paid a certain sum in cash or taking annuities.

Mr. B. P. GREGSON seconded the motion, and it was carried unanimously.

The accounts, which were presented, having been approved and allowed,

The CHAIRMAN moved that a dividend after the rate of 10 per cent. per annum, less income-tax be paid.

Mr. B. P. GREGSON seconded the motion, and it was agreed to.

The retiring Directors (Messrs. Howitt and H. Gregson) and Auditor (Mr. Edmondson) were then re-elected.

Alderman PRESTON, responding to a request from the Chairman, explained the manner in which the Corporation would probably raise the money necessary for the purchase of the works.

Mr. WELCH, after paying a high compliment to the management of Mr. Fleming, referred to the loss sustained by the directorate in the deaths of Dr. de Vitre and Mr. Harrison. Those gentlemen had, he said, been Directors of the Company for a long term of years, and it was to their exertions and those of their colleagues on the Board that the substantial prosperity of the concern had been built up. He was sure they would all approve of the proposal to erect a suitable memorial to Dr. de Vitre, and he did not think they could have chosen one more appropriate than that selected. The Shareholders were much indebted to the Directors for the energy, zeal, and attention which they gave to their interests. It made their meeting that day rather a sad one to miss three faces from the Board, and the work must have fallen very heavily on those who remained—Mr. Roper particularly, who had devoted much time and labour to obtaining their Act of Parliament; indeed, no one but him could have given the same good advice and assistance. They must be glad that the services of the Directors would be continued to them another year, and he moved that the thanks of the Shareholders be accorded them for their services in the past year.

Mr. EDMONDSON seconded the motion, remarking that he heartily concurred in all Mr. Welch had said in reference to the Directors whose deaths had taken place during the last twelve months.

The motion was carried unanimously.

The CHAIRMAN acknowledged the compliment, and said the past year had been a busy one—one of a good deal of anxiety and responsibility. When, however, such matters occurred, it was best to take the bull by the horns and grapple with the difficulty. Their works were second to none in the kingdom, for, though he had been through many, he never saw any so efficient as their own, and they were now in a position to supply one-half more gas than they had ever done before.

Mr. SIMPSON proposed a vote of thanks to the Manager, Mr. Fleming, and said it must be a matter of gratification to that gentleman to hear first one Engineer and then another who had gone over the works say they were superior to most and second to none in the kingdom. They owed a great deal to their Manager, as it was entirely to the great care and attention which he had bestowed on the works that their prosperity was due.

The CHAIRMAN, in seconding the motion, said he could heartily endorse the opinion expressed by Mr. Simpson as to the ability of their Manager, the prosperous state of the concern being mainly due to his exertions.

Mr. FLEMING, in acknowledging the compliment, said it had always been his endeavour to do his best for the benefit of the Shareholders generally, and it was gratifying to him to find his services so much appreciated. He was quite satisfied that the purchase of the works would be a good one for the town, and considered the Corporation had done well to secure them. The outlay now required was one that would soon repay itself. The works were in good order, and nothing more of any moment was required to keep them up till the consumption had increased 50 per cent.

The meeting then terminated.

LEA BRIDGE DISTRICT GAS COMPANY.—The report of the Directors submitted to the half-yearly meeting of this Company last Tuesday—Mr. J. B. Paddon in the chair—stated that, notwithstanding the reduction in price of 6d. per 1000 cubic feet, the gas-rental for the six months ending June 30 was greater than it was for the corresponding period of last year. During the half year considerable extensions of the Company's works had been made, and would be available for use in the ensuing winter. From the profits at the disposal of the Shareholders, the Directors recommended the declaration of a dividend at the rate of 7 per cent. per annum, free of income-tax.

SUNDERLAND GAS COMPANY.

The Annual Meeting of this Company was held last Wednesday—Mr. E. C. Robson in the chair.

The following report of the Directors, with the statement of accounts, was taken as read:—

The reduction in price announced at the last annual meeting has resulted in a diminution of income, which, however, has been nearly met by increased consumption and lessened cost. Encouraged by this result, your Directors now propose a further reduction, making the net price for prompt quarterly payment 2s. 9d. per 1000 cubic feet, with the usual additional discount to large consumers.

The extensive additions to your works at Hendon (towards the erection of which, new capital, amounting to £12,500, has been raised during the last two years) are nearly completed; and your Directors congratulate you on being now in possession of a manufacturing plant competent to meet any increase in the demand for gas likely to arise for many years to come.

An interim dividend was paid in March last, and your Directors now recommend the declaration of a further dividend of 5 per cent. on the original stock, and of 4¼ per cent. on the additional capital stock of the Company. They also recommend the payment at the same time of 5s. per share on the original stock of the Company, on account of the deficiency in the dividends of previous years.

The Chairman, in moving the adoption of the report and accounts, said he should not follow the course usually adopted on similar occasions, and preface his remarks by deploring in doleful terms the state of the times. If the times were bad he had no doubt they had discovered it. The accounts of the Company showed that the times, as far as they at least were concerned, were very good. On reference to the accounts, it would be seen the Shareholders capital was increased by the sale of 500 shares of the additional capital last year, and, as a consequence, the interest to be paid on the stock would increase in proportion, inasmuch as they bore 8½ per cent. dividend. The revenue account showed a return from gas and meter-rental of £42,666, being a diminution of £399 from last year's receipts; but when he informed them that last year they reduced the price of gas 2d. per 1000 feet, representing a loss of £1976, they ought to have looked for a reduction of that amount. But there was to compensate it an increase in the quantity of gas sold, and also a decrease in the cost of the material used for manufacturing the gas—namely, coals, so that the absolute deficiency was only some £322 5s. 10d. This was a very satisfactory state of affairs. Further, as the result of the reduction, the public would gain an advantage at the rate of about £2000 per annum. Owing to the reduced price of coke, the residuals did not realize so much as last year, the amount set down for them in this year's accounts being £7557 0s. 4d. In wages, there was little or no difference this year, and in coals a slight decrease of £375. Ground, deposit, and water-rents formed a not very fluctuating item, while in rates and taxes there was an increase of £75. Salaries and direction varied but little, while in incidental law charges there was a considerable decrease, owing to the fact that during the year the Company had been living a life of peace. They had had no one finding fault with them, at least not to the extent of going to law, for so long as people only grumbled they did not mind. The profits of last year showed a decrease of £325 3s. 10d., and, under these circumstances, he trusted the dividend they were declaring would be satisfactory. They would probably expect that, as he alluded at some length last year to the danger they were in from the electric light, it was but right that he should return to the subject on the present occasion. Since last year the public had been enlightened by the report of a Parliamentary Committee on the subject of lighting by electricity. It contained 2121 questions and answers, all more or less apposite to the subject. The Committee was composed of several men eminent in science, and had Dr. Lyon Playfair for its chairman. The Committee had examined some of the first men in the country, including Sir Wm. Thompson, Dr. W. Siemens, &c., and the conclusions the Committee had arrived at were no other than they might have come to without asking the 2121 questions, and receiving 2121 answers. He might say, so far as the lighting of streets and houses was concerned, the Committee went no further than the point he (the Chairman) indicated at the last annual meeting, when he fully admitted his expectation that large open spaces would be lighted by electricity. The Committee, in the report, spoke as to the electric light having already established itself for lighthouses and large symmetrical open spaces. It was fitted for these large "symmetrical" open spaces, and a very valuable word was here employed, because it implied places where there were no projections to throw dark shades, but circles or square parallelograms. That fully bore out what he told them last year. The next question was one of economy. He told them, as far as he could see, that gas was less expensive. The report said, "compared with gas, the economy for equal illumination does not yet appear to be conclusively established." With regard to the distribution and control of electricity, he was rather disappointed the Committee had not paid more attention to this part of the subject. The report, however, stated "that so far as we have received evidence, no system of central origin and distribution, suitable to houses of moderate size, has hitherto been established." He thought he was entitled to claim that, in the few remarks he made to them last year, he was within the facts. They were under a very great obligation to the electric light agitation, because it had, in the first place, entirely staved off any desire on the part of the Corporation to purchase the gas-works, leaving them entirely free from persecution from these gentlemen, except as consumers. It had done another good thing. Mr. Gladstone at Chester the other day said the most marvellous sight to him was an Englishman under pressure in manufacturing production. The electric light had put them under pressure. They were on their mettle. They had been asked what they could do. They could do a great deal. At the corner of their offices might be seen at night a lamp four or five times the size of an ordinary street lamp. This was fitted with a Sugg's patent burner, consuming 50 or 60 feet of gas per hour, and giving a light equal to 200 candles, or ten times that of an ordinary gas lamp in the street. These latter, he might say, were no bigger, owing to the niggardliness of the Corporation and the poverty of the ratepayers, but the Company could sell them a light five or six times as big, if the consumers were in a position to buy it. The Corporation were at liberty to try the electric light, but he could tell them it would be a bad bargain. He congratulated the Shareholders on having stood so firm, for an exceedingly small number of shares had changed hands. They stood as well as any other Company in that respect, and if there was any person who felt fidgetty about the electric light, the best thing he could do would be to get out of the concern when he could obtain a fair price for his shares and before another scare came, for he observed that Mr. Edison had taken out another patent for something. There was one other matter, and that was with regard to the scare. They did not know, and probably never would, to what extent it was the result of a planned stock exchange combination, or an honest unmeaning fright on the part of shareholders. But there was one thing which must have been noticed, that there were individuals both in the press and otherwise, who had absolutely chuckled over the approaching ruin of a number of innocent shareholders, many of whom were ladies and trustees. Notwithstanding the pleasure he experienced in the superseding of old styles and manual labour, by the increase of knowledge of science and mechanics, to him one of the most painful things was the displacement of labour and capital. He hoped that whatever improvements might take place, the trouble, which fell on capital and labour, would be softened by other circumstances. He might mention that they contemplated a reduction in the price of gas, equal to £1125 to private consumers, and they had made a reduction of £450 to the Corporation in the charge for the public lamps, making a saving to the town of £1575. He trusted this would be recouped by increased consumption. Coals were low this year, and he hoped, therefore, they would not thus endanger that very valuable item, the statutory dividend.

The report having been adopted, the dividends recommended therein were declared.

The retiring Directors—Messrs. E. C. Robson, J. Bowley, and W. Tate—were re-elected, and Mr. G. R. Booth was appointed in the place of Mr. J. Tindell.

The vacancy caused by the death of the senior Auditor (Mr. W. Blackett) was filled by the election of Mr. T. W. Haddock.

The Chairman, in responding to a vote of thanks, said the Directors would endeavour to deserve the confidence of the town by making such reductions in the price of gas as they possibly could.

The proceedings then terminated.

WREXHAM GASLIGHT COMPANY.

The Fortieth Annual General Meeting of this Company was held on Tuesday, Aug. 26.—Mr. W. Overton in the chair.

The Secretary (Mr. T. Walker) read the following report of the Directors:—

The expenditure upon capital account during the year has been £257 6s. 8d., and the balance carried forward amounts to £725 13s. 9d.

There have been 63 additional consumers supplied with gas during the year.

In the early part of January last, your Directors had much pleasure in announcing a reduction of 3d. per 1000 cubic feet in the price of gas throughout the district supplied. Upon the present consumption this is equal to a loss of revenue of nearly £400 per annum; but the reduction being upon one half year only, the accounts, as compared with the previous year, show an increase of £78 4s. 1d. for gas supplied. This must be attributed in a great measure to the unusually severe winter, when the demand for both gas and coke was necessarily greater.

There is only one item of expenditure upon revenue account to which special reference need be made, and that is "rents, rates, and taxes," which are more than the preceding year by £243 13s. 7d., owing to the re-assessment of the Company's property. An addition of £1272 was made to the previous rateable value, which your Directors considered most excessive, and, therefore, appealed against the increase, and succeeded in obtaining a reduction of £528. The rates paid by the Company in the borough alone now amount to £326 per annum, equal to a charge of 2¼d. upon every 1000 feet of gas sold.

The Directors recommend the payment of a dividend for the past half year at the rate of 5 per cent. upon the stock, and 3½ per cent. upon the shares, making, with the interim dividend paid in March last, the maximum rates for the year; also, that out of the surplus profit, the following dividends be paid, to make up the deficiency of former years, viz:—Year ended June, 1873, 2½ per cent. upon stock, making 10 per cent. paid; year ended June, 1872, 1 per cent. upon the first issue of shares, making 7 per cent. paid.

The Chairman, in moving the adoption of the report, said that the works of the Company were in good order, and so were the mains. The illuminating power of the gas supplied was about 2 candles above the standard required by the Company's Act of Parliament. The last reduction of 3d. per 1000 feet had practically brought the price down to 3s. 6d.; but if the illuminating power was taken into consideration, the price was little over 3s.—a price as low as any other town similarly situated. Wrexham appeared at present at a standstill in regard to building operations, for though there were some houses in course of construction, there were more vacant premises than had been the case for some time, and had it not been for the very severe winter and heavy weather, the make of gas by, and consequently the results to the Company would not be as favourable as they were. There was a large increase in the assessment of the Company, and necessarily in the rates. The amount paid last year was equal to 1s. 10d. in the pound on profits. With regard to the electric light, which there was so much talk about at one time, and which was going to cast all other lights in the shade, that "scare" had well-nigh passed away; only one of the Company's Shareholders having been sufficiently scared as to sell his shares. Until, however, some cheap motive power was adapted to its use, he did not think it would ever affect them in Wrexham. He then referred to the Auditor (Mr. John Bury), who retired at this meeting, but offered himself for re-election, saying that, like himself, Mr. Bury was at the formation of the Company, his connection having been continuous for the lengthened period of over 40 years, and during the whole of that time he had maintained a watchful care over the Company's interest and success. He also made a kindly allusion to Mr. Thomas Walker, who had been the Company's Secretary for the past twelve years, and said that the Directors well knew and appreciated his worth. In conclusion, he assured the Shareholders that the Directors were most assiduous in giving their best attention to the interests of the Company, and found that the work was as well carried out by a reduced number, and as expeditiously, as when the Board consisted of nine members.

Mr. A. W. Edwards seconded the resolution, which was carried unanimously.

Mr. Cumbebbach moved, and Mr. E. Rowland seconded, the re-election of Mr. J. Allmand as Director.

This proposal was agreed to, and Mr. T. E. Jackson was elected a Director in place of Mr. T. Williams, deceased.

The retiring Auditor (Mr. J. Bury) was re-elected, and it was ordered that the sum of ten guineas be paid the Auditors for their services during the current year.

Mr. Bury, in returning thanks, referred to his forty years experience with the Company. It did not seem long to look back upon, he said, but a great many events had occurred during the period. The Company had extended their ground and enlarged their borders, and he thought the prosperity of the town had increased with the prosperity of the Company.

It was then resolved: "That the interim dividend paid in March last be confirmed, and that the Shareholders now declare one for the half year ended the 30th of June last, at the following rate—viz., at 5 per cent. upon consolidated stock, and 3½ per cent. upon shares, making respectively 10 and 7 per cent. per annum;" and "That out of the surplus profit available, a back dividend of 2½ per cent. for the year ended the 30th of June, 1873, upon stock, and 1 per cent. for the year ended the 30th of June, 1872, upon the first issue of shares, be declared and paid with the ordinary dividend."

The Chairman said this might seem a somewhat extraordinary resolution, but counsel's opinion had been taken respecting the matter, and it was decided that the Company were entitled to these back dividends. For eighteen months they had only received a dividend of 3½ per cent. per annum at the time when coal was at so high a rate.

A vote of thanks was proposed to the Chairman, for the admirable way in which he had conducted the business of the meeting, and also for the very able manner in which he had superintended the welfare of the Company generally.

The Chairman acknowledged the compliment, and the proceedings terminated.

Bristol Water Company.—The Directors of this Company, at their meeting on Saturday, Aug. 30, resolved to declare an intermediate dividend for the half year to the 30th of June, on the £25 and £20 (£14 paid) ordinary shares, at the rate of 10 per cent. per annum.

RICHMOND (SURREY) GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, the 28th ult.—Mr. F. Chapman presiding.

The report, which was taken as read, congratulated the Shareholders upon the satisfactory results shown in the accounts, and recommended that a dividend be declared, for the half year ending 30th June last, of 5 per cent. on the original capital, and 4 per cent. on the new capital, being at the rate of 10 and 8 per cent. per annum respectively.

The revenue account showed the following expenditure:—Manufacture of gas, £7211 15s. 2d.; distribution, £344 9s. 9d.; public lamps, £181 12s. 3d.; rent, rates, and taxes, £215 2s. 2d.; management, £767 10s. 9d.; and various small items, which, with the balance of £3673 0s. 8d., made a total of £12,468 17s. 8d. The receipts were: By sale of gas, £9917 18s. 4d.; residual products, £2452 10s.; services, &c., £76 15s. 10d.; rents, £21 13s. 6d.; total, £12,468 17s. 8d.

The Chairman moved the adoption of the report. After referring with regret to the absence through illness of one of the Directors (Mr. J. H. Gosling), he said that in the present state of depression which prevailed in every part of the world, it was satisfactory to see that there was still one bright star in the horizon, and that was the gas companies. The very dulness, coldness, and darkness of the weather which had so prejudicially affected other investments had actually increased their prosperity by adding to the consumption of gas. He was also pleased to inform the meeting that although more gas had been manufactured by their Company, it had been produced at a smaller cost. There was another thing that he thought they would be glad to hear, which was that, considering the condition of the works and the prospects they had for the future, the Directors felt justified in entertaining the hope—they made no promise—that at Christmas they might be able to reduce the price of the gas by 3d. per 1000 feet. If they could do so it would bring down the charge to such a price as would put the Company in the van of all gas undertakings in the neighbourhood. Considering that their reserve-fund now amounted to £4476, the Directors thought the Shareholders would say that, during the last six months, things had prospered with the Company, and that they were justified in holding out the hope of a reduction in the price of gas. Under these circumstances he had no hesitation in asking them to pass the report and statement of accounts, and to order the payment of a dividend at the rate of 10 per cent. per annum on the original shares, and 8 per cent. per annum on the new.

Mr. Hutt, after expressing satisfaction at the smallness of the law charges (£14 10s. 2d.) and bad debts (£46 1s. 9d.), seconded the motion, which was carried unanimously.

The Chairman then stated that should the Directors be able to reduce the price of gas by 3d. per 1000 feet, the law would allow them to increase the dividend on the new shares by 1 per cent.

Mr. Warren proposed, and Mr. Rydon seconded, a vote of thanks to the Chairman, and this having been carried and acknowledged,

Mr. Hillier proposed a vote of thanks to the Directors, Secretary (Mr. E. B. Blott), Manager (Mr. J. Eldridge), and other Officers of the Company, expressing sympathy with Mr. Gosling in his illness.

Mr. Warren seconded the motion, which was adopted.

The Chairman, in returning thanks, said that the whole of the Officers of the Company had strictly endeavoured to do their duty to the Shareholders, and to keep themselves alive to everything that was going on in the gas world. The works of the Company were really model works, and should they at any time be called upon to hand them over to any public body, they would not be ashamed of the state in which they would be found, but would be able to ask a full and sufficient price for them.

The proceedings then terminated.

LEWES GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Mr. E. Morris presiding.

The Clerk (Mr. E. Hillman) read the following report:—

The Directors have the pleasure to report that the transactions for the half year ending June 30, 1879, have been satisfactory.

The balance on the revenue account amounts to £1283 7s., and the Directors recommend that £60 13s. be taken from the profit and loss account (making together £1344), thus enabling them to declare a dividend at the rate of 5 per cent. for the past half year upon the capital of the Company.

The Directors are making necessary alterations for erection of additional retorts. Plans and specifications are prepared for a new gasholder, and the Directors have invited tenders for the execution of certain works in the construction of tank foundations.

The Chairman moved that the report be received, adopted, and entered on the minutes. He said he thought the Shareholders would agree with the Directors that upon the whole the report was satisfactory, inasmuch as the Directors offered them the same dividend as they did at the last half-yearly meeting. The past year had been one of great anxiety to the Directors. The question of proceeding with very extensive alterations had been under their consideration, and, in consequence of the limited area on which the works were situated, it had necessitated the removal of old buildings and the erection of a new one. He hoped that the result of the arrangements which they were now making progress with would prove as satisfactory to the Shareholders as it did to the Directors.

Mr. Crosskey seconded the motion, which was carried unanimously.

Mr. Godlee moved that a dividend at the rate of 5 per cent. be paid.

Mr. Lenny seconded the proposal; and, after some discussion had taken place as to the necessity for the suggested reconstruction of the works, the motion was agreed to.

The retiring Directors—Messrs. R. Crosskey, H. D. Browne, and C. R. Kemp—were re-elected; as was also the Auditor—Mr. M. S. Blaker.

A resolution was then submitted calling on the Directors to reconsider their proposal as to the alteration of the works and plant; but it was eventually withdrawn.

Mr. Godlee moved a vote of thanks to the Directors and Chairman. The Directors, he said, had had a very anxious time of it, and he considered the Shareholders were much indebted to them for the pains they had taken in the Company's interests.

Mr. Hammond seconded the motion, and it was carried *nem. con.*

In response, Mr. Morris said they had had many meetings of a very anxious character. Their desire was solely to do their duty properly to the Company for which they acted, and they could have no interest separate from the Shareholders. They were Shareholders themselves, and they could have no possible object or desire to expend money unnecessarily. Economy would always form one of their principal studies. He also thanked them for their acknowledgment of his services as Chairman.

The meeting then terminated.

Vienna (West) Water-Works Company.—This Company, which was incorporated on the 13th ult., with a capital of £400,000, in £20 shares, proposes to acquire and carry out a concession granted on the 15th of April last by the Niederösterreichische Stadthalterei to Franz Zuillner von Zaillenthal, for the establishment of water-works for supplying the inhabitants of the western side of the city of Vienna with water from the River Wien and its tributaries. Power is taken to acquire and carry on other works of a similar character.

DERBY GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Saturday, the 30th ult.—Mr. G. Gascoyne in the chair—when the report of the Directors, which was presented, recommended that the price of gas in the outlying districts (outside the old borough) should be reduced 4d. per 1000 feet from the 1st of October next. The accounts for the half year ending June 30 showed profits amounting to £8176 4s. 11d., and, after paying a dividend on 2400 original shares of £1 5s. per share, 17s. 6d. on the same number of new shares, and a sum of £351 19s. 9d. on allotted original shares, a sum of £2724 5s. 2d. remained to be carried forward. The total receipts for the half year were £22,853 10s. 7½d.

The Chairman moved the adoption of the report and payment of the dividends recommended. He said it was in contemplation to make some very extensive additions to the works. This must be done—there was no option for them. Their Act of Parliament compelled them to perform certain duties, and if they shirked these the property would be taken from them and placed in other hands. If they did not make extensions, Derby would soon have a deficiency of gas supply. If they did not undertake the work, they would probably find this winter that they had insufficient means for supplying the town with gas. Therefore it was an absolute obligation on their part to undertake these extensions. Although the new works might cost as much as £50,000, and possibly even more than that, the balance this half year, after paying full statutory dividends, was £2724. This large surplus would have to be absorbed in a couple of years—or a great reduction at least would be made therein, in consequence of the step the Directors recommended of reducing the price of gas in the outlying districts. A very considerable disparity had prevailed between the price of gas in the outlying districts and the old borough. He believed that last year 6d. per 1000 feet was taken off some of the outlying districts, the price then being 5s. per 1000. The highest prices now were 4s. 6d., 4s., 3s. 9d., and, in one case, 3s. 6d. per 1000. The price in the old town was from 2s. 8d. varying to 3s., according to the amount of consumption. That difference being considerable, the Directors felt it necessary to make a nearer approach to equality, and this they proposed to do by taking off 4d. per 1000 feet in the outlying districts, and leaving the old borough just as it was. They hoped to ascertain in the course of the next two or three months whether they should be able to extend the reduction as to apply equally to the whole area. That was one form in which they should be able to account for the surplus revenue, and they had great pleasure in coming to the conclusion that this course could be taken, seeing that they charged now almost as low as any town in England. The price charged by the Nottingham Corporation was 2s. 8d. per 1000 feet, and a short time ago a proposal to reduce that amount by a trifle was defeated. If they were able to carry out the reduction of the price in the old borough of Derby they would be below the price charged at Nottingham. The property of the Company throughout was in very good working order, and everything pertaining to it had been conducted regularly and satisfactorily. He complimented the chief officials on their great assiduity, and pointed out that the work must of necessity have greatly increased where the income was £45,000 a year against £18,000 a few years ago. He also referred to the electric light, which, he said, was causing such a scare to gas companies at the time of the last meeting, and he said, although the light might be very useful for lighthouses and important establishments, it would never answer in a town like Derby, with its dwellings and small manufactories.

Mr. Owen seconded the resolution; and, after some discussion, it was carried unanimously.

There was no other business.

CANTERBURY GAS AND WATER COMPANY.

The Half-Yearly Meeting of this Company was held on Friday, Aug. 29—Mr. G. Furley in the chair.

The following report was taken as read:—

The Directors have again the pleasure to congratulate the Proprietors upon the prosperous state of the Company's affairs.

The manufacturing plant at the gas-works is in good working order, and fully capable of meeting the wants of the consumers for some time. Complaints having been made of a deficient supply of gas to the barracks, a new and additional main has, under an arrangement with the War Office authorities, been laid down to afford an increased supply of gas to the garrison. Your Directors will from time to time give their attention to the distributing plant generally, with the view to increase it wherever it may be found necessary.

Your Directors are pleased in being able to announce that an arrangement has been entered into with the War Department for a permanent supply of water to the Canterbury garrison, and it has, in consequence, been found necessary to extend the softening accommodation at the Thanington Works. Plans and specifications have accordingly been prepared and a contract entered into with Mr. Gaskin for the construction of new softening and lime water reservoirs, and the work is now being proceeded with. The new residence for the Engineer at the works has been completed, and will be ready for occupation in a few days. The Company's mains have been extended to several streets not hitherto supplied with water.

The accounts show a credit standing to the profit and loss account of £4587 16s. 2d., and your Directors recommend that the usual dividend for the half year at the rate of 8 per cent. per annum, free from income-tax, be declared.

The Chairman, in moving the adoption of the report, said he thought they would all agree with him that it was a very satisfactory one in every particular, and especially that portion which related to the arrangement which had been entered into with the War Office authorities for a permanent supply of water to the barracks. He then referred to the action of the Directors with regard to the payment of £8 per share upon the 800 shares, called up some time ago; and, after stating that the Directors had no power to call on the holders for more than £2 per share on the £6400 which was due, he said that, in response to the appeal made by the Directors, the Shareholders had paid up the sum of £5444, which he thought was sufficient to show the confidence they reposed in the Directors. He wished to draw attention to what was the position of the Company ten or eleven years ago, and what it was at the present time. He had a balance-sheet of the Company for the half year ending Dec. 31, 1868, when they had a capital of £45,000, and they then paid a dividend of 6 per cent. per annum, and had a reserve-fund of £172. But what was their position at the present time? They had increased their capital by increasing their plant to the extent of £82,000, they now paid a dividend of 8 per cent. per annum, and they had also increased their reserve-fund from £172 to £8200. That was, in short, the work they had been doing during the last ten or eleven years. What had, he asked, been the use of the reserve-fund during the period he had named? It had been practically applied to the work which had been done by the Company, and during that time the reserve-fund had been temporarily used in the works of the Company, when their assets had fallen short for that purpose. He found the capital account had been overdrawn during the half year. That meant they had done more work than they had called up capital for the purpose of doing that work, and the reserve-fund had enabled the Company to perform that work. It had also enabled them to purchase coals, and so carry on the manufacturing operations of the Company. Those were the purposes to which the money of the reserve-fund had been applied. They, however, now felt that the Company had arrived at such a state that the reserve-fund could be taken out of the assets of the business, and put as a separate investment. They had therefore called in the amount of £6400, and had during the month of July invested in

Consols the sum of £6500 on account of the reserve-fund. They would allow the dividends on that money to accumulate until the reserve-fund was made up to £8200, and if ever the profits of any half year fell short of 8 per cent. (the dividend which they were entitled to pay), which he trusted would never happen, they could go to that money and take so much of it as would enable them to pay the maximum dividend. The Directors had now placed the affairs of the Company in a good position; but there was another side of the question, and that was regarding the case of the consumers. If the profits went on as fast as they had done, and they were making money beyond the amount required for expenditure in the manufacturing of gas, and for dividend, the amount beyond this would have to go towards a reduction in the price of gas, so that the consumers would participate in the prosperity of the Company.

Mr. Flint seconded the motion for the adoption of the report, and it was carried unanimously.

The Chairman then moved that the dividend at the rate of 8 per cent. per annum for the half year ending June 30, 1879, be paid.

Mr. Flint seconded the proposal, and it was also agreed to.

The usual votes of thanks were passed, and the meeting terminated.

WREXHAM WATER-WORKS COMPANY.

The Annual Meeting of this Company was held on Wednesday, the 27th ult.—Mr. W. Overton presiding.

The Secretary and Manager (Mr. F. Storr) read the notice convening the meeting, and the following report was presented:—

The expenditure on capital account of £3292 14s. 7d. includes the balances due to the representatives of the contractor on account of the construction of Cae Llwyd reservoir, the payment of the engineers for professional services, and the balances due on account of the parliamentary and legal expenses in connection therewith.

The water account for the year shows an increase, as compared with last year, of £331 8s. 7d.

The total receipts for the year for water, and the profit upon fittings, amount to £3302 7s. 9d. After payment of the usual charges—the preferential dividend at 5 per cent., the interim dividend at 6 per cent. per annum, for the half year ended December, 1878, and interest upon the mortgage debt for the year ended June 30, 1879—a balance remains on net revenue account of £714 12s. 11d., which includes the sum of £368 14s. 6d. withdrawn from the reserve-fund in March to meet the deficiency arising from the payment of the interim dividend.

The Directors recommend the declaration of the second half year's dividend upon the consolidated stock at the rate of 5 per cent. per annum, and at the rate of 5 per cent. per annum upon the preference shares (both free of income-tax), necessitating the withdrawal from the reserve-fund of the sum of £310 7s. 1d.

During the year, water has been laid on to 210 houses, making a total of 2887 now supplied.

The revenue of the Company, although steadily increasing, has not, during the past year, escaped the effects of the general commercial depression now prevailing.

A winter of unusual severity, during which much inconvenience and expense were caused to both the Company and consumers by the freezing up and bursting of pipes, has been followed by a summer most unfavourable to the consumption of water.

Owing to the peculiar combination of circumstances, the supplies by meter have fallen off, and it is alone due to the rental derived from domestic consumers that the revenue of the Company shows the increase indicated in the accounts.

The new works at Cae Llwyd being completed and brought into use, the Assessment Committee for the Wrexham Union have re-valued the whole of the Company's works. As the new assessment showed a very large increase, which the Board considered could not be justified, the Directors appealed, and were successful in obtaining a considerable reduction. The increased expenditure under the head of rents, rates, and taxes, is due to this re-valuation.

The Company's works and reservoirs are well maintained and in good order. The Pack-Saddle Reservoir having been emptied, thoroughly cleaned, and repaired—a proportion of the expense incurred being charged in the present accounts.

[The capital of the Company consists of £21,000 of 10 per cent. consolidated stock, and £20,000 of 5 per cent. preference shares. In addition to this, there are loans amounting to £9750, raised at 4½ per cent. The expenditure on capital account to June 30 was £57,073 8s. 7d. The receipts for the three years ending June 1877, 1878, and 1879, were £2846 10s. 10d., £3153 18s. 9d., and £3302 7s. 9d. respectively, while the expenditure was £1018 3s. 2d., £1112 16s. 10d., and £1115 2s. 5d. The balances carried to net revenue account, therefore, were £1828 7s. 8d., £2041 1s. 11d., and £2187 5s. 4d.]

The Chairman moved the adoption of the report. He said that the past year witnessed the final adjustment of all the balances due to the contractors and engineers in connection with the Cae Llwyd reservoir. Some small extensions of the mains and services to meet public requirements, costing about £262, had been made, and now, with the exception of two or three streets on the Caia estate, upon which no houses were yet built, the Company's mains (hydrants as well) were laid in all the chief roads and streets. The expenditure side of the accounts showed a saving of £2 as compared with the previous year. There was also a saving on the discontinuance of the auxiliary supply, but the greater proportion of this was absorbed under the heads of rents, rates, &c. Owing to the re-valuation of the whole of the Company's works, and some parts brought under assessment that were not before included, a much larger amount was now paid in local rates, and in some parts, as, for instance, the Cae Llwyd reservoir in Ruabon parish, they were very high. Should there be any chance of a reduction on another appeal, advantage would be taken of it. The amount expended on repairs and maintenance, notwithstanding the extensions, was less, and would have been lower still but for the exceptionally severe winter. In this was included some of the expense of a thorough cleansing out of the reservoir at Pack Saddle Bridge—a work that could not be accomplished until the completion of the new reservoir at Cae Llwyd, which furnished the Company with the means of supplying the district. Only part of the expense of this was charged in this year's accounts. Taking the expenditure as a whole it was 33·76 per cent. less than any year since 1871, and almost 5 per cent. less than that year. Turning to the receipts, the revenue from water showed an increase of £231. The nominal rate of increase had not been maintained—a fact easily accounted for by the continued depression of trade and stagnation of building operations, as well as the past wet season, not to be called summer. The Directors viewed the increase in water-rates with considerable satisfaction, showing, as it did, the growing capacity of the Company, notwithstanding adverse circumstances. In the report for the year 1875, the Board pointed out to the Shareholders the expediency of creating a reserve-fund to fall back upon when the interest and dividends on the new works would have to be drawn from the revenue. That necessity had arrived, and a portion of the fund had been appropriated in payment of the interim dividend in March last, and a further appropriation was now necessary. The Company were well able to meet the growing wants of the district, and capable of affording a constant supply to a population of 25,000 persons, with a water of great purity; for tests it had been subjected to proved it to, be of excellent quality for domestic supply, and very soft. The permanent hardness was 1·8; while the water of Thirlmere was 2·25; and of Vyrnwy, 2·75. It only needed a revival of that commercial activity so much desired, to secure to the Company the prosperity which through many difficulties and anxieties it had long been struggling for. Notwithstanding the severe weather of the past winter, the reservoir bank and all its surroundings had stood quite intact. The capital powers of the Company had been exceeded by more than £6000, for which sum the Board were personally liable, and had under consideration the steps to be taken to relieve them of the responsibility.

Dr. Davies seconded the motion, which was carried unanimously.

In reply to Mr. Lewis, the Chairman stated that the reduction of the assessment on appeal was from £1200 to £861.

The Chairman then moved that the interim dividend paid by the Directors for the half year ended Dec. 31, 1878, amounting to 6 per cent. per annum upon the consolidated stock and 5 per cent. upon the preference shares, free of income-tax, be approved, and that a further dividend at the rate of 5 per cent. per annum upon the consolidated stock and 5 per cent. upon the preference shares, both free of income-tax, be now declared.

The motion was seconded and agreed to; and the retiring Directors (Mr. E. Davies and Mr. J. Clark) and Auditor (Mr. J. Bury) were re-appointed.

Mr. Eddowes proposed that the sum of £100 be paid to the Directors as an acknowledgment of their services during the past year.

Mr. Lewis, in seconding the motion, said that every Shareholder of the Company was indebted to those gentlemen who formed the Board and undertook to carry on the very responsible duties which devolved upon them. In giving his meed of praise to the way in which the Directors had attended to their duties, he thought he should not be going out of the way if he acknowledged the duties of the Secretary and Manager (Mr. Storr) who had shown a zeal, industry, and application in all the affairs of the Company which reflected great credit upon him. They all knew they had had Secretaries in times gone by who not only gave trouble to the Directors, but were a source of considerable anxiety to the Shareholders. He hoped the connection which had been formed between the Board and Mr. Storr would be long continued, and that he would be enabled to devote his time and talents to the affairs of the Company for many years to come.

The Chairman, in putting the motion, said he quite endorsed all that had been stated in regard to Mr. Storr.

The motion having been carried and acknowledged,

The Chairman said the Directors had under consideration the question of the best means by which to raise the £6000 which they had overspent. The expenditure of this sum had been incurred on several heads, one of which was the new reservoir, which had cost much more than was expected; and another the extension of their mains to Pulford.

Mr. Sisson moved a vote of thanks to the Chairman, which was seconded by Mr. Davenport, and unanimously agreed to.

This concluded the business.

GLASGOW CORPORATION GAS SUPPLY.

At the Meeting of the Glasgow Town Council, last Thursday—the Lord Provost (the Hon. W. Collins) presiding—the minutes of the Gas Committee, which were presented, contained the following report:—

The Committee on gas supply beg to submit to the Town Council their tenth annual balance-sheet which embraces the twelve months from June 1, 1878 to May 31, 1879.

The gross revenue for the year amounts to		£337,963 12 11
And the gross expenditure, which includes the sum of £17,955 7s. 8d., being the usual percentage written off capital for depreciation for the year, to		259,352 14 1
Showing a balance to profit and loss account of		78,610 18 10
Out of which have been provided—		
1. Annuities on stock	£34,038 5 8	
2. Interest on borrowed money	25,908 4 9	
	£59,946 10 5	
3. Sinking-fund	11,382 17 7	
		£71,329 8 0
Leaving a surplus on the year's transactions of		£7,281 10 10

The surplus added to the balance carried forward from former years made the sum at the credit of profit and loss account as at May 31, 1879, £47,618 16s. 7d.; but, after due deliberation, your Committee recommend that, in addition to the above sum of £17,955 7s. 8d. written off for depreciation, the further sum of £13,110 10s. 4d. be applied in reduction of capital expenditure; carrying forward, in the meantime, to credit of profit and loss account a balance of £34,508 6s. 3d. The rate of depreciation proposed to be written off this year would thus be 2½ per cent., instead of 1 per cent., on works and pipes, and 6 per cent. on meters, as formerly—in all, £31,065 18s. It will also be observed that the sum of £11,382 17s. 7d. has been carried to the sinking-fund, which is at the rate of 2 per cent. on borrowed capital, instead of 1 per cent., as in former years.

Your Committee, after advertising for tenders for gas coal to be delivered during the currency of the present financial year, have completed contracts for the year's supply on what they consider favourable terms.

Your Committee recommend that the price of gas be reduced from 4s. to 3s. 10d. per 1000 cubic feet, this reduction to take effect retrospectively from the date of last survey.

The quantity of gas sold and accounted for during the year is 1,533,219,000 feet, being an increase of 3¼ per cent. over the preceding year.

The sinking-fund now amounts to £54,728 0s. 5d., of which £42,500 was applied at Martinmas last in the redemption of mortgages, as directed by the Act, and in conformity with a resolution of the Town Council.

The property in Old Wynd belonging to the Trust has been sold to the Glasgow and South Western Railway Company for the sum of £5960, and as it stood on the books at £1169 15s. 2d., there has been realized on the sale a surplus or profit of £4790 4s. 10d., which has been placed to the credit of capital account.

No extensions have been made to the manufacturing plant during the year. All the works have been maintained in a state of efficiency and good repair. The greatest consumption of gas last winter, in one day, was 11,985,000 cubic feet, as compared with 10,620,000 cubic feet in the previous year. The producing power of the works is 13,000,000 cubic feet in 24 hours.

Some discussion took place as to the price to be charged for gas supplied to the public lamps, in the event of the proposed reduction being agreed to; and it was resolved to refer the report back to the Committee for re-consideration.

The Liverpool Corporation (Vyrnwy) Water Scheme.—At a meeting of the Tewkesbury Corporation last Thursday, the Town Clerk called attention to the proposal of the Liverpool Corporation to take a supply of water from the Vyrnwy, and produced communications received from the Worcester Town Council and the Severn Fishery Board, asking co-operation with other corporations and sanitary authorities in an endeavour to obtain the abandonment or postponement of the scheme. It was resolved to co-operate, by petition or otherwise, in opposing the scheme, but not to incur any expense in the matter.

Chesterfield Water-Works and Gaslight Company.—The half-yearly meeting of this Company was held on Friday, Aug. 29, when the Directors reported that the revenue of the Company continued to be prejudicially affected by the great and prolonged depression in the general trade of the district, and that the profits of the half year to June 30 were almost the same in amount as for the corresponding period of last year. The expenditure on capital account amounted to £174,651 7s. 4d.—viz., £85,827 5s. 3d. for water-works, and £88,824 2s. 1d. for gas-works. The balance in hand, on capital account, was £6518 12s. 8d. The income from the water undertaking was £3281 17s. 10d.; and from the gas undertaking, £5914 1s. 10d.; the expenditures being £836 17s. 9d., and £2956 10s. 4d. respectively. The balance carried to net revenue account, therefore, was £5402 11s. 7d. It was proposed, out of the balance of this account—£6338 12s. 8d.—to pay the following dividends, less income-tax:—At the rate of 2½ per cent. on £20,000 of £50 preference shares, £8000 of guaranteed stock, and £21,200 of £10 preference shares; 3½ per cent. on £93,110 of £10 ordinary shares, and £6774 of ordinary shares (1878 issue); and 5 per cent. on £11,200 of ordinary stock. These dividends would amount to £5175 16s. 3d., and leave a balance of £1162 16s. 5d. to carry forward.

ELECTRIC LIGHTING AT LIVERPOOL.

At a Special Meeting of the Liverpool Town Council last Wednesday—the MAYOR (Mr. T. B. Royden) in the chair—the minutes were presented of the Library, Museum, and Arts Committee. These contained the following, among other, recommendations:—

That the tender of the Liverpool Gas-fittings Company, Limited, for running lead pipes, altering iron pipes, supplying and fixing iron rail, including iron scroll and wood work, at the Picton Reading-room, for the sum of £163 10s., be accepted.

To approve the report of the Borough and Water Engineer containing the following estimate of the cost of the necessary buildings and apparatus for lighting the Picton Reading-room by electricity, and a comparative estimate of the annual cost of lighting by gas and by electricity:—

Capital Account.

Engine, machines, &c., to be provided by the British Electric Light Company	£729	0	0
New engine-house, foundations for engine, door through wall, &c..	225	0	0
Glass screen, &c.	30	0	0
Central column, &c.	80	0	0
Contingencies, 5 per cent.	50	0	0
Total	£1114	0	0

That the Borough and Water Engineer be instructed to arrange with the British Electric Light Company, Limited, for the supply of an engine, machinery, and fittings for lighting the Picton Reading-room and other parts of the building; the engine to be for ten lights of 4000 candles each, and the other apparatus for three lights, including six lamps, at a cost not exceeding £729.

That the tender of Mr. Henry Firth for erecting an ornamental column in the Picton Reading-room for the electric light for the sum of £75 be accepted.

Mr. PICTON, in moving the adoption of the recommendation, stated that the Committee had decided to have an alternative mode of lighting the reading-room by gas in the event of anything going wrong with the electric light.

After some discussion on the first recommendation,

Mr. PICTON said that the Corporation had gone to Parliament, and, after considerable expense, obtained an Act to enable them, to a certain extent, to carry out a system of electric lighting. The first scheme that offered itself in fulfilling the object of the Act seemed to be the lighting of the new reading-room, and the Committee had given the matter the greatest consideration. He might state that the engine would do considerably more work than was now required, so that there would be spare power to carry out the light further to illuminate, if necessary, St. George's Hall, the Walker Art Gallery, the Derby Museum, or the esplanade in front.

Dr. CROSS said that the electric light would not compete with gas so far as cheapness was concerned, but its contingent advantages were great.

Mr. J. B. SMITH considered the Committee would not be justified in charging the whole of expense to capital account.

Mr. YATES asked why the present engine in St. George's Hall could not answer the purpose.

Mr. BOWER said they wished to throw the responsibility upon the Electric Light Company that the light should be steady and available for reading. The Company stipulated that the engine should be steady, and the engine they were possessed of now was a very irregular one, the result of which they saw in the Steble fountain.

The recommendations were then unanimously confirmed.

SALES OF GAS AND WATER SHARES.

The following sales of gas and water shares have recently taken place:—

EXETER.—Last Wednesday, 20 original shares in the Exeter Gas Company were sold—16 at £44 10s. each, and the remainder at an advance of 10s. per share.

WATFORD.—On Tuesday, the 26th ult., there were offered for sale by auction 158 shares in the Watford Gas and Coke Company, and the whole of them were disposed of, realizing £3081 10s. There were first sold 5 lots of one fully paid-up £24 share, Class A, bearing a dividend of 10 per cent. per annum. These realized £41 10s., £42 10s., £42 15s., £43 5s., and £43 5s. respectively. The next 57 lots consisted of two fully paid-up £10 shares, Class B, bearing a dividend of 10 per cent. per annum. These sold, 2 at £20 5s., 46 at £20 10s., 48 at £20 15s., 8 at £21, 6 at £21 5s., and 4 at £21 10s. For lot 63—three similar shares—£20 15s. per share was obtained. The rest of the shares were those issued under the Company's Act of 1871, which limits the dividend on the additional capital to 7 per cent. while the Company charge more than 4s. 6d. per 1000 feet for gas; to 8 per cent. when the charge does not exceed that amount; and to 9 and 10 per cent. when the price of gas is not more than 4s. and 3s. 9d. per 1000 feet respectively. The present price is 4s. 6d. per 1000 feet, so that 8 per cent. is paid on the shares. There were 21 fully paid-up £10 shares, which sold at the following prices:—6 at £15, 2 at £15 5s., 4 at £15 10s., 6 at £15 15s., and 3 at £16. There were also 15 similar shares, £5 paid, and these were bought—4 at £7 15s., 7 at £8, and 4 at £8 5s.

WHITSTABLE.—On Tuesday, Aug. 26, ten £20 fully paid-up shares in the Whitstable Gas and Coke Company, Limited, were sold by auction. Five of them were purchased for £210, and the remainder for £222 10s., being at the rate of £44 10s. per share, the highest price that the shares of this Company have ever fetched. On the same day, ten £10 fully paid-up shares in the Whitstable Water Company were sold for £105.

STOKE-UPON-TRENT CORPORATION GAS SUPPLY.—At the meeting of the Stoke Town Council on Thursday, Aug. 28th, it was stated that, owing to good management of the gas-works by Mr. M'Millan, the Corporation had placed to their credit £1400 as their share of the profits for the past year, and that the sum of £700 had been paid to the Fenton Local Board as their share of the profits. It was explained that this amount did not represent the total profits for the year, but was paid as an interim dividend, the financial year not having expired.

ARDSLEY GAS COMPANY.—The half-yearly meeting of this Company was held on Thursday, Aug. 28—Mr. W. Challenger in the chair. The report presented by the Directors stated that the business of the past half year had resulted in a profit of £150 15s. 1d., and the Directors recommended that a dividend at the rate of 4 per cent. per annum be paid. This would absorb £120, and the residue, £30 15s. 1d., would be carried to the reserve-fund. The report was unanimously adopted, and an extraordinary meeting was then held for the purpose of considering the following resolution:—"That the capital of the Company be increased from £6000 to £12,000; and that the Directors be authorized to increase the capital accordingly, by the issue of 1200 shares of £5 each, the shares to be issued by the Directors at such times and in such manner as they may think necessary." The Chairman said the reason for this resolution was that there was a mortgage of £2000 on the works, for which the Company were paying 4½ per cent. They had, in fact, overspent their capital to the extent of about £400. The Company at present were crippled by this debt, and if any Shareholder thought proper he might file a petition against them for going beyond their capital. It was felt to be only right to clear off this mortgage if they possibly could. The course they recommended to be adopted would not be expensive—no parliamentary costs—and the Directors wished to be authorized to proceed as was suggested in the resolution. The proposal was agreed to, with the alteration of the amount of the shares from £5 to £1.

THE TEMPERATURE OF TOWN WATER SUPPLIES.

By Mr. BALDWIN LATHAM, C.E., M. Inst. C.E., F.G.S., &c.

[A Paper read on Thursday, Aug. 21, before the Mechanical Science Section of the British Association at Sheffield.]

Temperature has a considerable amount of influence in rendering a supply of water palatable or otherwise. An increase in temperature beyond about 55° renders water vapid and insipid, and favours certain organic developments that render some water unwholesome.

The supply of water as it exists in geological strata, such as the chalk, new red sandstone, and other geological formations, possesses, *in situ*, a marked uniformity of temperature throughout the year. It is on this account that some of the most distinguished men of science strongly recommend a public supply of water from the chalk, new red sandstone, and other water-bearing strata, as being more agreeable for dietetic purposes than the water supply taken from other sources liable to considerable changes of temperature.

It has been generally assumed that water taken from superficial sources, such as from a river, or from impounding reservoirs, contrasts unfavourably, in regard to its temperature, with water supplied from wells and springs. It will be generally admitted that the water in deep wells has a pretty uniform and agreeable temperature throughout the year. On the other hand, the water supply in rivers or impounding reservoirs has a fluctuating temperature varying with the season of the year, being warm in summer and cold in winter, while the water in wells is always much colder than the ordinary temperature of summer, and is warmer than the ordinary temperature of winter. The water of shallow and polluted wells is often used for dietetic purposes in preference to the supply of pure water laid on to a house, in consequence of the agreeable and refreshing temperature of the well supply.

That changes of temperature do influence water to a considerable degree is clear, as every rise of temperature in water liberates air and other gaseous matter contained in the water. On the other hand, water will imbibe the gaseous matter when again cooling down; and it is on this account that water stored in the cistern of a house attracts to itself impurities, and is thus rendered foul and unwholesome. It is a singular fact, however, that if the mean temperature of the water, as derived from a river or from a well, is taken, throughout the year there is very little difference in the mean temperature, but very considerable difference in the range of temperature—that is, between the highest and the lowest temperature observed during the period. The temperature of water at its source, whether it be in a well or a river, and the temperature of the water as delivered to the house of the consumer, are, however, totally different things, and this is a point which has hitherto been overlooked.

The author has made a number of observations on the temperature of water, both at its source and as delivered to the consumer, and these results show that whatever the source of water supply, there is very little difference in temperature when the water arrives at the tap of the consumer. The water at its source may have a very uniform temperature, such as is possessed by supplies taken from the chalk or the new red sandstone, or it may have considerable range of temperature, as in the case of water taken from an impounding reservoir or from a river; but, notwithstanding these differences of temperature, the water as delivered will be found to be possessed of a temperature pretty nearly that of the temperature of the ground throughout the year, at the depth at which the distributing mains of the district are laid. In summer all water-mains tend to either raise or maintain a high temperature of the water supply, while in winter they act as refrigerators, and cool or raise the temperature of the supply according to whether the water at its source possessed a higher or a lower temperature than the temperature of the ground at the depth at which the mains are laid.

For upwards of 2½ years the author has daily observed the temperature of the chalk water as supplied to his house at Croydon, and has also noted the temperature of the water in the water-works wells before it has been pumped for supply. In making the observations at the author's house, the water was taken from a tap in direct communication with the street-main, and in every case the water was allowed to flow from the tap for a sufficiently long time, or until the temperature had become uniform. It should also be noted that the water supply of the district has been constant during the whole period over which the temperatures given in this paper refer.

Taking the results of the last twelve months, commencing July, 1878, to the end of June, 1879, a period which embraces some of the hottest and the coldest weather we have experienced for some years past, it was found that while the temperature of the water in the wells, before being pumped for the supply, gave an average temperature throughout the year of 50·96° Fahr., the range of temperature (or the difference between the highest and the lowest temperature) was but 0·64°, the highest average temperature for the month being 51·28°, in September, and the lowest 50·64°, in March. The highest average temperature of the water for the month, delivered at the author's house direct from the mains, was 62·25°, in July, and the lowest was 41·11°, in January, showing a range of 21·14°; while the average temperature throughout the year was 50·37°, being only 0·59° under the average of the water in the wells, while the difference in the range was 20·5°. This same water, when stored in an exposed cistern at the author's house, was found to possess an average temperature of 68·71° in July, and 40·66° in January, showing a range of 28·05°. The average temperature in this cistern throughout the year was 52·03°, being a difference of but 1·07° from the average temperature of the water in the wells.

The underground temperature has also been observed at various depths by the author; and a thermometer, in a tube 2·75 feet in depth, during the same period was found to give an average temperature throughout the year of 48·77°, the greatest average being for July, 63·79°, and the lowest, 37·04°, in January, showing a range of 26·75°. Another thermometer, in a tube 4·75 feet deep, gave an average temperature throughout the year of 49·41°, the greatest average temperature being in August, 60·89°, and the lowest in November, 40·40°, showing a range of 20·49°. The water-mains in Croydon are laid, as a rule, at a level between the depths of the two tubes, the temperatures of which have been before given. It will therefore be seen that the temperature of the chalk water at Croydon is modified by the temperature of the ground in which the mains are laid, and at which it flows to the consumer.

During the same period, daily observations of the temperature of the water supplied at the author's offices in Westminster were taken, the supply being derived from the Thames, through the Chelsea Water Company's mains, by the intervention of a cistern. These experiments show that the average temperature throughout the year was 51·04°, differing but 0·67° from the average temperature of the chalk water as delivered direct from the mains at the author's house at Croydon, and differing but 0·08° from the temperature of the chalk water within the wells at Croydon. The range of temperature was found to be 24·69°, being highest in July, 65·29°, and lowest in January, 40·60°.

The author has also, from time to time, at different places, observed, in towns drawing their water supply from impounding reservoirs, this same marked difference of temperature, and that the temperature of all

water, whatever its source, is influenced in every case, and at every period of the year, by the temperature of the ground at which the distributing-mains are laid, and, consequently, the temperature of water furnished from water-works and supplied to the consumer is totally independent of the temperature of the water at its source.

Table showing the Temperature of Town Water Supplies, 1878 *and* 1879.

Date.	Average Daily Temperature in Water-Works Wells, Croydon.	Average Daily Temperature of Water supplied from Mains, Croydon.	Average Daily Temperature of Water in Cistern, Croydon.	Average Daily Temperature of Ground at 2·75 Feet deep, Croydon.	Average Daily Temperature of Ground at 4·75 Feet deep, Croydon.	Average Daily Temperature of Water supplied at Westminster.
1878.	Degs.	Degs.	Degs.	Degs.	Degs.	Degs.
July. . .	51·07	62·25	68·71	63·79	59·86	65·29
August. .	51·22	61·93	62·96	62·90	60·89	63·87
September .	51·28	58·62	59·46	59·51	59·08	58·87
October .	51·23	55·22	55·76	54·57	55·49	55·18
November .	51·10	46·71	46·53	44·58	48·28	45·46
December .	50·91	42·78	42·51	38·71	43·02	41·26
1879.						
January . .	50·82	41·11	40·66	37·04	40·44	40·60
February .	50·73	41·81	43·48	38·45	40·40	42·31
March . .	50·64	43·34	45·66	40·95	41·98	44·96
April . .	50·80	47·09	47·41	44·24	44·31	46·76
May. . .	50·76	48·85	51·50	45·18	46·96	50·36
June . .	51·03	54·74	59·80	55·42	52·22	57·65
Totals for 12 mnths.	611·59	604·45	624·44	585·34	592·93	612·57
Average . .	50·96	50·37	52·03	48·77	49·41	51·04
Maximum .	51·5	64·8	71·5	66·3	61·3	68·4
Minimum .	50·5	39·7	33·6	35·25	38·2	38·2
Mean . .	51·0	52·25	52·55	50·77	49·75	53·3
Range . .	1·0	25·1	37·9	31·05	23·1	30·2

Mr. J. Oldham, C.E., asked if Mr. Latham could tell him the various temperatures in artesian wells from 1400 to 1800 feet deep.

Mr. Latham said he had made a very large number of observations, and had found that the temperature of the overflowing wells at Wandsworth was about 52·5°. The temperature of water in wells varied very greatly. In some of the deepest wells the temperature was colder than in the shallow ones. The movement of the water through the strata of itself increased the temperature. Diarrhœa was most largely produced when the water supply became heated beyond a certain point. Until the water delivered to towns reached something over 60° of constant temperature, diarrhœa did not break out in that town. During this summer the temperature of the water had been 5° less, and the result was that diarrhœa had prevailed only in a very slight degree. The temperature of water was, from a sanitary point of view, extremely important, and one which ought to be more fully investigated in regard to its influence upon certain classes of disease.

Mr. J. W. L. Glaisher, M.A., F.R.S., said that, having long been connected with the Registrar-General's Office, he had frequently had to take the temperature of the Thames water. It had long been recognized as a fact that cholera or diarrhœa never showed itself to any great extent until the Thames water reached 62°. It stood to reason that when the water-pipes were of small diameter, and laid near the surface, the water partook of the temperature of the surroundings. He was in favour of having a much larger diameter of supply-pipe. Water at a depth of 50 or 60 feet differed very little from the climate, but at a depth of several hundred feet the temperature was higher.

Captain Douglas Galton, C.B., said that the water-pipes should, as much as possible, be kept below the ground. The statements which had been made were a strong argument in favour of the abolition of cisterns, and in favour of a constant water supply.

A vote of thanks was then accorded to the reader of the paper.

THE "ACME" STREET LAMP REGULATOR.

This regulator burner is the invention of Mr. Frank Wright, son of the late Mr. Alexander Wright, who, we believe, has devoted his attention for many years to the improvement of the governor in its various forms, and the "Acme" is the result of his labours.

The engraving shows a part section of the burner full size. It consists of five pieces—viz., the top and bottom cases (A and B), of brass; the burner (C), of steatite; the disc (D) and the cylinder (E), of a specially prepared incorrodible metal.

The action of the apparatus is as follows:—The gas enters at the base through an orifice in the centre of the disc and through two holes in the sides of the cylinder, until of sufficient pressure to overcome the weight of the disc, when it raises it. The holes in the cylinder are then closed and the pressure caused to accumulate above the disc and establish equilibrium. By this means a constant difference of pressure is obtained at the orifice in the disc and a constant consumption results.

The following results of experiments made with a dozen of the "Acme" regulators have been supplied by the inventor:—

Pressure.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.	No. 12.
5-10ths .	4·8	4·8	4·85	4·85	4·8	4·8	4·8	4·9	4·85	4·85	4·8	4·8
25-10ths .	4·8	4·85	4·85	4·85	4·8	4·9	4·85	4·9	4·9	4·85	4·9	4·8

The regulators used were made by improved machinery to calculate size and were not adjusted as is the case with the ordinary regulators.

The "Acme" is also made to suit consumer requirements—screwed in like an ordinary nipple—and gives a steady, noiseless, and brilliant flame.

Reduction in the Price of Gas at Altrincham.—It is announced that the Directors of the Altrincham Gas Company have passed a resolution for reducing the price of gas from 4s. 3d. to 4s. per 1000 feet. A discount of 4½d. per 1000 feet will be allowed for prompt payment, instead of 5d., as heretofore.

NOTES ON PETROLEUM SPIRIT OR "BENZOLINE."

By Mr. Alfred H. Allen, F.I.C., F.C.S.

[A Paper read before the Chemical Section of the British Association at Sheffield.]

The application of the commercial names "benzoline" and "benzine" to the more volatile portion of petroleum has led to great confusion between petroleum spirit and coal-tar naphtha, the most characteristic constituent of which is the hydrocarbon *benzene* or *benzol*.

Although presenting close general resemblances, the following characteristic differences exist between petroleum spirit and coal-tar naphtha. All the tests given have been carefully verified by the author on representative samples of petroleum spirit and coal-tar benzol:—

Petroleum Spirit, "Benzoline" or "Benzine."	*Coal-Tar Naphtha, or "Benzol."*
1. Consists of *heptane* C_7H_{16}, and its homologues.	1. Consists of *benzene*, C_6H_6, and its homologues.
2. Heptane contains 84·0 per cent. of carbon.	2. Benzene contains 92·3 per cent. of carbon.
3. Commences to boil at 54° to 60° C.	3. Commences to boil at about 80° C.
4. Specific gravity at 15·5° C. about 0·69 to 0·72.	4. Specific gravity about 0·88.
5. Smells of petroleum.	5. Smells of coal-tar.
6. Dissolves iodine, forming a solution of a raspberry-red colour.	6. Dissolves iodine, forming a purple-red liquid of the tint of an aqueous solution of potassium permanganate.
7. Does not sensibly dissolve coal-tar pitch, and is scarcely coloured by it, even on prolonged contact.	7. Readily dissolves coal-tar pitch, forming a deep brown solution.
8. When shaken in the cold, with one-third of its volume of fused crystals of absolute carbolic acid, the latter remains undissolved, and forms a separate lower stratum.	8. Miscible with absolute carbolic acid in all proportions.
9. Requires two volumes of absolute alcohol, or four or five volumes of methylated spirit of 0·828 sp. gr., for complete solution at the ordinary temperature.	9. Miscible with absolute alcohol in all proportions. Forms a homogeneous liquid with an equal measure of methylated spirit of 0·828 sp. gr.
10. Warmed with four measures of nitric acid of 1·45 sp. gr. the acid is coloured brown, but the spirit is little acted on, and forms an upper layer.	10. Completely miscible with four measures of nitric acid of 1·45 sp. gr., with great rise of temperature and production of dark brown colour. A portion of the nitrobenzene produced may separate as the liquid cools.

The greater number of the above tests are valueless when applied to mixtures of petroleum and coal-tar naphthas, but No. 10 is capable of giving quantitative results if the treatment with nitric acid be conducted in a small flask and an inverted condenser attached, to prevent loss of vapours. When action has nearly ceased, if the liquid be poured into a narrow graduated tube, the measure of the upper layer indicates with approximate accuracy the amount of petroleum spirit present. If the proportion of benzene is considerable, the nitrobenzene produced may not remain completely dissolved in the nitric acid, in which case it rises and forms a layer of a dark brown colour below the stratum of petroleum spirit. Nitrobenzene and petroleum spirit are readily miscible in the absence of nitric acid, but agitation with strong nitric acid dissolves out the nitrobenzene, a portion of which may rise and form an intermediate layer as above described.

By fractional distillation, the author found that the proportion of heptane, C_7H_{16}, present in commercial benzoline, probably equalled, or even exceeded, that of all the other constituents.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Although a decidedly better tone is maintained in the iron market of this district, the coal trade is still without improvement. All classes of fuel continue bad to sell, with prices quite as low, and in a few instances even slightly lower than last month. With the exception that a few of the merchants who have facilities for stocking are buying extra quantities of the better classes of round coal, where inducements are offered by sellers, there is no material increase in the demand for house-fire coals. In gas coals consumers are now taking deliveries on account of contracts more freely; but there is very little new business coming into the market, and where any sales have lately been made the prices taken have been extremely low, one recent contract having been placed at a figure which would not leave more than about 6s. per ton for good gas Arley at the pit mouth. The inferior descriptions of round coal for iron making and general manufacturing purposes continue a drug, owing to the very small requirements of consumers generally; and orders are pushed for at extremely low figures. Engine fuel, with the exception of some of the better sorts of slack, is still bad to sell, and prices continue low. The average prices ruling at the pit mouth are about as under: Best Wigan Arley, 8s. to 8s. 6d.; common sorts, 6s. to 7s.; Pemberton, four feet, 5s. 9d. to 6s. 6d.; common round coal, 4s. 6d. to 5s. 3d.; burgy, 3s. 9d. to 4s. 3d.; good slack, 2s. 9d. to 3s. 3d.; and common, 2s. to 2s. 6d. per ton.

There has been rather more demand for coke, but no better prices are being obtained, large cokes at the ovens being quoted at about 14s., and small cokes at about 10s. per ton.

Considerable sales of Lancashire pig iron have been made during the past fortnight, and although makers have still heavy stocks on hand, they decline to book further orders, except at an advance of about 2s. 6d. per ton upon late rates, No. 3 foundry pig iron delivered into the Manchester district being now quoted at 47s., and No. 4 forge at about 46s. per ton, less 2½ per cent. In finished iron there has also been more doing, and although there is no actual advance in prices, manufacturers are now firm at their full list rates, and are very cautious about entering into anything like prolonged deliveries at current quotations. For delivery into the Manchester district good ordinary Lancashire bars are quoted at from £5 7s. 6d. to £5 10s. per ton.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The gas coal trade of the county of Durham entered upon September business on Monday. There were strong westerly winds prevailing in the North Sea over last week. Light tonnage was kept back in consequence. The shipments were not quite so good, therefore, as the week before. But it was purely accidental, and the difference in the quantities exported

would not be material. With so much best gas coals contracted for, any change which may occur in the market cannot be large, and there is never any very great excess of coals offered for single cargoes. Steamers are taking out gas coals to the Baltic. It is likely that the gas-works in that sea will avoid being caught by a long and tedious winter as they were in the last. They will lay in pretty full stocks. Business favours them very much—or rather merchants who have contracted to supply them with coals—as freights are low. The coasting business is dull. The demand from the Channel ports is very quiet. Gas coals were exported to Ireland last week. The freight stands at about 6s. 6d. per ton to the principal towns. The steam collieries of Northumberland are well employed.

An interesting feature in connection with the London coal trade from the Tyne occurred on Tuesday, in the launch of the screw steamer *Lambeth*, the third of a fleet of boats built by Messrs. Palmer and Co., Limited, Jarrow, to carry gas coals above the bridges in the London river. Up to a couple of years ago there were no means of conveying gas coals to the great gas-works situated above London Bridge, except by transhipping them into barges in the Pool, and by them carried to the gas companies wharves. Messrs. Nicholls and Co., of London, saw their way out of this difficulty about a couple of years ago, and several iron shipbuilders were communicated with by them. Amongst them were Messrs. Palmer and Co., who built the first two boats put into the trade. They have now finished and launched the third, the *Lambeth*. The *Lambeth* is 220 feet long, 32 feet broad, and 15 feet deep. She carries 1000 tons of coal on a draught of 12 feet of water, She has a peculiar arrangement forward, called a "turtle back," for throwing water from her stem instead of allowing it to sweep along the decks in rough weather at sea. She has a double bottom for water ballast throughout. Her engines are 99-horse power nominal. The building of the vessel and engines has been superintended by Mr. A. Nicholls, one of the owners.

Several hundreds of tons of Spanish common lead were sold in the Tyne last week, at £14 15s. per ton. This shows an advance in price. The shipments of fire-bricks and fire-clay goods to the Continent are large. The rate of freight paid sailing vessels to deliver fire-bricks at London, mostly for the gas companies, is 7s. above the bridges, and 6s. to discharge below bridge.

The Durham gas coal trade suffered a great loss last week by the death of Mr. Edward Joicey, one of the senior partners in the great Durham colliery firm of Messrs. James Joicey and Co., who possess an extensive group of gas collieries, shipping on the Tyne. Mr. Joicey amassed a large fortune in the gas coal trade. He was a generous, warm-hearted gentleman, and was much respected.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Since despatching my last week's report, I have learned that the Directors of the Dunfermline Gas Company have fixed the price of gas for Townhill at 5s. 5d. per 1000 cubic feet.

It has been resolved to hold the next half-yearly meeting of the West of Scotland Association of Gas Managers on Thursday, the 18th inst., the place of meeting being Bridge of Allan, as resolved upon at the last meeting. In addition to the address of the new President (Mr. Mitchell, Coatbridge) there are expected to be papers by Mr. D. B. Peebles, Mr. Carlow, and Mr. Young, of Clippens.

The arrangements for the Gas Apparatus Exhibition, which it was resolved some months ago to hold in Greenock, are now practically complete. It is intended to open the exhibition on Tuesday evening in the Watt Institution, and to keep it open for ten days. The Gas Committee of the Police Board have agreed to give a supply of gas free of charge. A number of economical contrivances for cooking by means of gas will be exhibited, and visitors are to have opportunities of testing the merits of a large variety of systems. Engines of various power driven by gas, capable of working heavy machinery, or delicately adjusted to the requirements of a lady's sewing-machine; strange methods of illumination; a large variety of lamps, gas-burners, &c., demonstrating the most recent advances made in the science of illumination, are to be exhibited by the inventors or their representatives, and accurately described by means of short lectures) and their utility illustrated by experiments. Many of the best English and Scotch makers of gas-stoves, gas-engines, &c., have sent a variety of their goods; and altogether the matter has been well taken up and promises to be a great success. The exhibition, the first thing of the kind in Scotland, is to be publicly opened by Provost Lyle. Addresses are to be delivered on the occasion by Mr. James Stewart, M.P.; Provost Somerville, of Port Glasgow; Provost Binnie, of Gourock, and other gentlemen.

A very successful demonstration of the invention known as the "albo-carbon light" was made last week in the business premises of Messrs. Thomas Rowatt and Son, Edinburgh. There were present Bailies Anderson and Rowatt; Dean of Guild Smith; Councillor Drybrough; Mr. Paterson, City Assessor; Mr. David Currer, S.S.C.; Mr. J. Falconer King, City Analyst and Gas Examiner; Dr. Ronald; Mr. Paterson, Inspector of Lighting, &c. Mr. James Livesey, the patentee, was also present to describe the apparatus and to illustrate the new system of lighting. The experiments were made, in a darkened room of moderate size, with a cluster of six lights—one carburetting reservoir supplying the whole; and a brilliant illumination of the interior was secured. The photometer test was afterwards applied; and, with a No. 1 burner consuming about 2½ cubic feet of gas per hour, an illuminating power of 8·5 candles was obtained from the ordinary gas, whereas with the carburetted gas the illuminating power was from 19·5 to 20 candles. The economic advantages of the albo-carbon light were urged in a variety of ways, and from the data mentioned it was shown that with gas at 4s. per 1000 feet a gas consumer adopting the new system could obtain as much illumination for 5s. 6d. as is now obtained for 12s.

Ex-Bailie Wood, in his capacity as Gas Examiner for the burgh of Dumfries, has just issued his report for the quarter ending Aug. 31, 1879, during which the average illuminating power of the Corporation gas was equal to 25·78 standard candles.

At their ordinary meeting, held last Thursday, the Gas Commissioners of Dumfries agreed to supply the street lamps in Maxwelltown during the current season, at the rate of 5s. 10d. per 1000 feet, provided that gas-burners approved of by the Gas Manager be used.

At a meeting of the Sub-Committee on Works of the Glasgow Gas Committee, on the 27th ult., the Engineer reported that the connections upon the new main between Partick and Dawsholm have been completed, and that gas was now being supplied from the works at Dawsholm to the district formerly supplied from Partick station. The Sub-Committee, therefore, recommended that as the Partick works were no longer necessary they should be closed, which recommendation was approved of.

The Dundee Gas Commissioners held their usual monthly meeting last Wednesday, when, on the recommendation of the Sub-Committee of the Works Committee, the meeting agreed to accept 2000 tons of climpy double-screened small coal at 6s. 4d. per ton, and 4000 tons of best Sunderland small coal at 6s. 8d. per ton. It was reported that the average illuminating power of the gas supplied during August was 26 candles. The amount of gas-rental collected for four months ending the 31st of August was £7843, being £706 more than at the same date last year.

Langside, a very important district in the southern suburbs of Glasgow, has never hitherto had any proper arrangement for the lighting of the public thoroughfares; but the leading inhabitants have now resolved that, if at all possible, this state of things shall no longer continue. Valuable property, belonging to the Glasgow Corporation and to Hutcheson's Hospital, lies within the district, and with the co-operation of those two bodies, and of the Road Trustees, they expect to be able to erect and maintain from 80 to 100 street-lamps.

The Glasgow pig iron warrant market was very strong during the past week, and the price reached up to 46s. 3d. cash on Friday afternoon. Large purchases have been made.

Irregularity is the rule in the coal trade, on account of the rise in prices and in the rate of the miners wages.

BIRKENHEAD CORPORATION GAS SUPPLY.—A meeting of the Birkenhead Town Council was held last Wednesday, when the Gas and Water Committee recommended that 15,000 or 20,000 superficial yards of land be purchased for the extension of the gas-works. Alderman Henderson, in moving the adoption of the recommendation, said that the consumption of the gas in the borough was increasing rapidly. In 1874, 174 million feet of gas were consumed, and in 1878 the quantity had increased to 234 millions. Mr. Willmer objected to the proposed site, as being in the very centre of the borough. Mr. Rawcliffe said that the works were on the lowest level, and, as the extension of the borough for the next ten years would probably be in Oxton and Tranmere, the site was admirable. Replying to Mr. Booth, he said the Committee did not in their deliberations take into consideration the electric light. The recommendation was adopted.

ASHFORD (KENT) GAS COMPANY.—The annual meeting of this Company was held on Monday, Aug. 11—Mr. J. U. Bugler in the chair. The Secretary (Mr. F. Hughes-Hallett) read the report of the Directors, which stated that the gas-rental had very considerably increased, and that the receipts from other sources had also, on the whole, increased. The expenses for the year were in about the same proportion as heretofore. During the past year they had been called upon to lay upwards of 1000 yards of 6-inch and 4-inch main on the Hythe-road, and about 900 yards of 4-inch and 3-inch main in the Park Fields; and although at present there were but few consumers in that locality, yet they hoped other parties would be induced in time to take the gas. At the works they had fixed a new tar tank, at a considerable expense; also an additional boiler. They hoped shortly to purchase a new exhauster. In consequence of these several heavy outlays, the Directors thought it would not be advisable at present to pay off any more of the bonded debt, but to consider the expenditure above alluded to in the nature of a reduction of such debt. They had been enabled to enter into a favourable contract for the supply of coal, and had also renewed, at a reduced price, the contract with the Local Board for lighting the public lamps. The works generally were in fair order, but it would be necessary during the ensuing year to renew some portion of the plant, and make additions and alterations to that now in use. The Directors had great pleasure in stating that their Manager, Mr. Morton, continued to give perfect satisfaction, and they attributed to him, in a great measure, the well-being of the Company. They had felt a pleasure in making an increase in his salary, and had also promised an addition to that of Mr. Culver, their Collector, as his duties had greatly increased. The Directors regretted that they had lost the able and valued services of their Managing Director, Mr. Linom. They had appointed Mr. Alfred Hart as Director in his place. Looking at the prosperous state of the undertaking, they recommended that the price of gas to consumers be reduced 5d. per 1000 cubic feet from the 1st of July last; also the payment of a dividend to the Shareholders of 7½ per cent.; free of income-tax. The gas-rental increased last year from £3842 to £4197, and the Chairman stated that last winter was an unusually advantageous one for the coke trade. The coke was sold as fast as it was made, and the stock was now very low. Mr. Harrison and Mr. Hook were then re-elected Directors of the Company, and an additional sum of £50 was voted for their remuneration; after which a vote of thanks was passed to the Chairman and Directors, and to the Secretary, Collector, and Manager, the latter of whom, the Chairman said, was the most zealous and diligent officer he knew.

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

3347.—BRAY, G., Leeds, Yorks, "Improvements in street and other lamps and burners; also in means employed for increasing the illuminating power, brilliancy, and steadiness of gas-flames." Aug. 19, 1879.

3355.—MORGAN-BROWN, W., Southampton Buildings, London, "Improvements in the manufacture of electrodes for the production of electric light." A communication. Aug. 20, 1879.

3470.—LAKE, W. R., Southampton Buildings, London, "Improvements in and relating to apparatus for supplying cities and other places with water." A communication. Aug. 28, 1879.

3482.—BROCKELBANK, G., Anerley, Surrey, "Economising oil, petroleum, gas, and other illuminating materials used in railway carriages, or to indicate the names of stations, and signalling trains, and other similar purposes." Aug. 29, 1879.

3500.—WETTER, C., Westminster, "Improvements in fluid pressure regulators." A communication. Sept. 1, 1879.

3507.—FAULDER, H., Stockport, Lancs, "Improvements in the application and apparatus for supplying gas to the roasting of coffee." Sept. 2, 1879.

3520.—MACKENZIE, J., Regent's Park, London, "Improvements in apparatus for cutting screws upon wrought-iron and other metal pipes, tubes, and cylinders." Sept. 2, 1879.

3555.—SIEMENS, F., Dresden, Germany, "Improvements in burners for gas, petroleum, and other lamps or lighting apparatus." Sept. 4, 1879.

3561.—PICKING, G. G., and HOPKINS, W., Bow, London, "Improvements in gas motor engines." Sept. 4, 1879.

3562.—LAKE, W. R., Southampton Buildings, London, "An improved method of and apparatus for manufacturing carburetted hydrogen gas." A communication. Sept. 4, 1879.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

840.—JOHNSON, S., and HAILSTONES, W., Wood Green, London, "Improvements in apparatus for preventing waste of water in water-closets, urinals, lavatories, and in other situations where intermittent supplies of water are required, and for regulating the supply of water in similar situations." March 3, 1879.

887.—NORRIS, A., Finsbury Park, London, "A new or improved material or compound to be burnt in lamps for illuminating purposes." March 6, 1879.

1095.—ADAMS, J., Glasgow, "Improvements in gas-stoves." March 19, 1879.

2056.—HANCOCK, A., and HEATH, H. S., Euston Road, London, "Improvements in meters for water and other liquids." May 23, 1879.

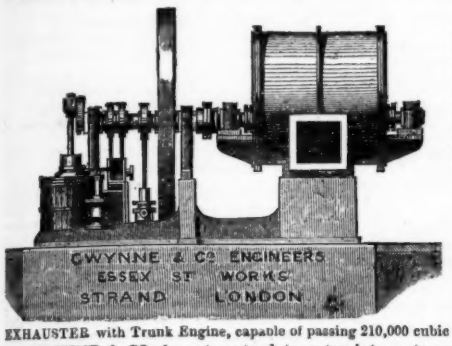
2110.—Siemens, C. W., Westminster, "Improved means and apparatus for producing light and heat by electricity." May 27, 1879.
2231.—Siemens, F., Dresden, Germany, "Improved means and apparatus for increasing the illuminating power of lamps and burners, also applicable for heating." June 5, 1879.
2305.—Ainsworth, J. C., Bury, and Roberts, R. K., Tottington, Lancs, "Improvements in regulating gas-taps or gas stop-taps." June 10, 1879.
2339.—Clark, A. M., Chancery Lane, London, "Improved means for obtaining light by electricity." A communication. June 12, 1879.
2378.—Adams, J., Crossgates, Fife, and Baird, A., Glasgow, "Improvements in apparatus for indicating and recording the pressure of air, water, steam, and other gases or fluids." June 16, 1879.
2682.—Livesey, J., Westminster, and Kidd, J., Wandsworth, London, "Improvements in apparatus for enriching illuminating gas." July 2, 1879.

PATENTS WHICH HAVE BECOME VOID
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3073.—Magniat, H. L., "A new or improved steam, gas, and water-tight metallic joint." Aug. 1, 1876.
3145.—Cathels, E. S., "Improvements in apparatus used in the purification of gas." Aug. 9, 1876.
3173.—Young, W., "Improvements in carburetting air and gases, and in the mechanism or apparatus employed therefor." Aug. 11, 1876.
3209.—Peyrousse, L. A. L. E. P. de la, "Improvements in the manufacture of gas." Aug. 15, 1876.
3319.—Duckett, J. D., "An improved cistern and self-acting water-waste preventer (superseding the ball-float)." Aug. 24, 1876.
3370.—Redfern, G. F., "Improvements in gas motor engines and in apparatus connected therewith." Aug. 28, 1876.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

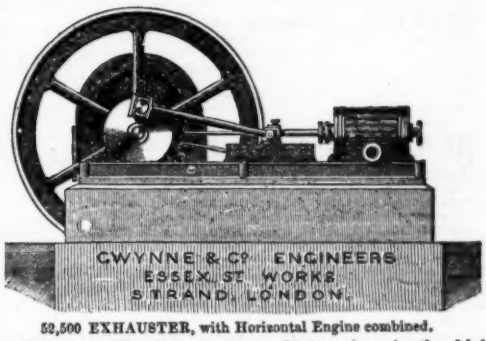
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

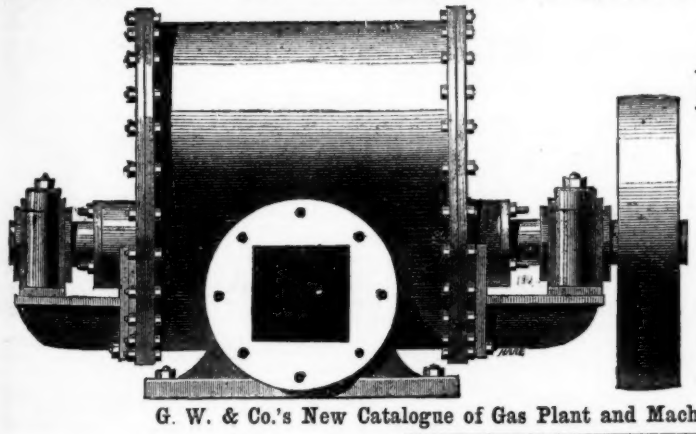
GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,



WITH OR WITHOUT
WROUGHT-IRON SPINDLES AND
ENGINES COMBINED.

GEORGE WALLER & CO.,
MAKERS OF
ENGINES, EXHAUSTERS,
INDEX AND DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, AND OTHER PUMPS,
SCRUBBERS AND PURIFIERS,
CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

PHŒNIX ENGINEERING WORKS:
HOLLAND STREET, SOUTHWARK, S.E.

THE IMPERIAL METER COMPANY, LIMITED,

FORMERLY ALSO WALTER FORD, AT GRAY'S INN ROAD.
MANUFACTURERS OF EVERY DESCRIPTION OF WET AND DRY GAS-METER.

KING'S ROAD, ST. PANCRAS, N.W.

Invite the attention of Gas Companies to their

DRY METERS,

As combining Materials of best quality and unusual strength, superior Workmanship, and every improvement.

Made also with seasoned wood outer cases for exposed positions.

The I. M. CO.'s Patent WET METER is known as the simplest Compensating Meter, frictionless, extremely accurate in registration, and less liable to derangement, from any cause, than any other Meter hitherto tested by use on a large scale.)

WANTED, Readers of the NEW Edition, 1879, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, by the Advertiser, a Situation as METER-INSPECTOR, Fitter, Index-Taker, &c.
Address ALPHA, care of Mr. Neale, 7, Rathbone Street, Barking Road, Canning Town, LONDON, E.

SITUATION Wanted, as Working MANAGER or FOREMAN of Gas-Works. Can turn his hand to Engine Repairs, Smithing, Plumbing, Gas-Fitting, Meter-Repairing, and anything in the Manufacture and Distribution of Gas.
Address A. HUGHES, Swindon Street, CHELTENHAM.

WANTED, by an energetic Man, aged 30, a Situation as MANAGER or ASSISTANT-MANAGER of a Gas-Works. Has had 14 years practical experience in the whole routine. Nine years in last situation. Excellent testimonials.
Address GAS MANAGER, 22, Gloster Street, Cambridge Heath, LONDON, E.

WANTED, a Situation as Manager of small or Foreman of large Works, or Retort-Setter, or for the Erection of Works at home or abroad. Holds first-class testimonials for a thorough practical knowledge of the same in all its branches.
Address G. A. S., 18, Sturgeon Road, Surrey Gardens Estate, Walworth, LONDON.

WANTED, a Re-engagement as MANAGER of a medium-sized Gas-Works, or ASSISTANT in a large works. Over 20 years experience in all branches. Has charge of Gas-Works making over 100 millions annually. Would consent to be paid by results. References, testimonials, &c., from previous employers.
Address No. 581, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Gas Engineer and Manager, to proceed to Australia at once. Qualified to take sole charge of works making 30 million cubic feet annually, and constantly increasing. Will be required to prepare full and accurate returns, keep books and register of manufacture and distribution and analysis of gas by photometer, possess some knowledge of mechanical engineering, and be able to plan and carry out extension of works and plant, and superintend working of steam and gas engines. All qualifications useless, if character as to ability, integrity, and sobriety will not bear strictest investigation.
Apply, by letter, to Mr. F. BROOKS, Messrs. Ashford and Brooks, King Alfred's Place, BIRMINGHAM.

MANAGER of Tar or Tar and Ammonia Distillery requires an Engagement. Has Practical Knowledge of all Crude and Refining Processes, &c.
Address K. G., May's Advertising Offices, 159, Piccadilly, LONDON, W.

TO BE SOLD, Cheap, Three Telescopic GASHOLDERS, two 60 ft. diameter and 20 ft. deep each lift, and one 70 ft. in diameter and 20 ft. deep. Only been in use eight years. May now be seen at work at the Effingham Street Gas-Works, Sheffield.
For price, apply to THOMAS PIGGOTT AND CO., Spring Hill, BIRMINGHAM.

TO PLUMBERS, GAS-FITTERS, AND BRASS-FINISHERS,

FOR immediate Disposal, in Exeter, a Good BUSINESS, established 34 years. Capital Workshops and Premises, adequate for a large concern. Owner retiring. Coming in about £200.
Apply to Mr. JOHN DAMEREL, Ironmongers Valuer, EXETER.

RAMSGATE IMPROVEMENT COMMISSIONERS—GAS AND WATER DEPARTMENT.

FOR SALE—A Single-Lift Gasholder, 60 ft. in diameter, 20 ft. deep, in good, sound, and serviceable condition, with Inlet and Outlet Valves, and Connections complete. Also two 12,000 Exhausters, four 12 in. Valves, Bye-Pass, Hydraulic Governor, Throttle-Valves, Connections, &c., complete.
Further particulars on application to
WILLIAM A. VALON, Engineer.

FOR SALE—Cast-Iron Socket Pipes and Connections for Gas or Water.

	cwt.	qr.	lbs.
75 Pipes, 14 in. by 9 ft., weighing each about	7	1	26
38 ,, 16 in. by 9 ft., ,, ,,	8	2	19

20 Bends, 14 in.; 20 Crosses, 14 in.; 10 Tees, 16 in.; 5 Bends, 16 in.; 5 Crosses, 16 in.
These pipes are new, and have been cast vertically at one of the best Glasgow foundries. They have been tested to a hydraulic pressure of 300 feet.
The above are offered for sale on account of smaller diameters being substituted for them. They will be sold cheap.
Apply to CASTEL AND LATTA, 3, Lombard Court, E.C.

DRY GAS-METERS.

WE have a large extra Stock of these, in three, five, and ten lights, of the best make, that we can offer at less than half the list price. Have been tested by the City Gas Inspector. Also a few 100 to 300 lights, equally low in price.
HODGE AND CO., Gas Engineers, 100 and 101, Hatton Garden, LONDON, E.C.

GAS PLANT FOR SALE.

A 10-in. Vertical Pipe Condenser, having 20 Pipes, each 19 ft. high, on Cast-Iron Base Box.
A Scrubber, 16 ft. high 5½ ft. diameter, fitted with thin boards, Self-Acting Liquor Distributor, 10-in. inlet and outlet pipes.
Two Single-Flue Cornish Boilers (new in 1870), each 9½ ft. long, 3 ft. 9 in. diameter; Fire Tube of Low Moor Iron, complete with all Fittings.
All in good working order; removed to make room for larger plant.
For further particulars apply to THOS. TREWHITT, Gas-Works, WEST HARTLEPOOL.
May 8, 1879.

THE LONDON GASLIGHT COMPANY.
NOTICE is hereby given that the ORDINARY HALF-YEARLY MEETING of the PROPRIETORS of this Company will be held at the Freemasons Tavern, Great Queen Street, Lincoln's Inn Fields, on WEDNESDAY, the 8th day of October, 1879, at Twelve o'clock precisely.
The Transfer Books will be closed on Tuesday, the 23rd day of September, until after the meeting.
By order of the Board,
A. J. DOVE, Secretary.
Dated this 3rd day of September, 1879.

MEMORANDUM.—Proprietors must hold capital stocks or shares paid up to the amount of £250, to be qualified to attend the meeting.

HARROW DISTRICT GAS COMPANY.
NOTICE is hereby given that the ORDINARY HALF-YEARLY MEETING of this Company will be held at the Guildhall Tavern, 1, Gresham Street, in the City of London, at One o'clock, on Wednesday, September 24, 1879, to receive the Directors and Auditors reports, to declare a Dividend, and to transact any other ordinary business of the Company.
The Transfer Books will be closed from the 16th of September until after the meeting.
By order of the Board,
J. L. CHAPMAN, Secretary.
Office, Gas-Works, Harrow, Sept. 8, 1879.

STATION-METER for Sale, to pass 10,000 cubic feet per hour (maker, Milne), with Valves and 9 in. Connections, complete.
Apply to the MANAGER, Gas-Works, Lea Bridge, LONDON.

IMPROVED PHOTOMETER DISCS.

PRICE for a single Disc, sent free by post, 1s. 7d. Price per dozen, 12s. 6d.
Apply to J. WILKINSON, Gas Engineer, &c., Grimesthorpe, SHEFFIELD.

EXHAUSTER wanted, second-hand, Beale's, of about 15,000 to 20,000 feet per hour.
Address, with particulars and price, No. 580, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXHAUSTER—Beale's 30,000 feet per hour; Makers, Burton and Waller; fit for immediate use—for sale cheap.
For price and particulars apply to the MANAGER, Brentford Gas-Works, SOUTHALL.

STOCK OF THE BRISTOL UNITED GASLIGHT COMPANY.

MESSRS. H. R. FARGUS and CO. will Sell by Auction, in pursuance and under the provisions of the Bristol United Gaslight Company's Act, 1873, at their Sale Room, 4, Clare Street, in the City of Bristol, on Friday, Sept. 19, 1879, at Two o'clock precisely, £20,000 Capital Stock, issued by them under the authority of the above-named Act. The stock will be sold in lots of £100 each.
For conditions of sale and any further particulars apply to the Auctioneers, Clare Street, Bristol; to the Secretary of the Company, Canon's Marsh, Bristol; or to Messrs. BRITTAN, LIVETT, BOX, AND CO., Solicitors, Albion Chambers, BRISTOL.

TO GASHOLDER MAKERS.

THE Directors of the Gloucester Gas Company invite TENDERS for a GASHOLDER, 140 ft. diameter and 35 ft. deep, to be erected at their new Works, Hempsted.
Drawings and specification can be seen, and forms of tender obtained, on application at their new Works, Hempsted, on and after the 15th inst.
Sealed tenders must be sent in to me, and marked "Tender for Gasholder," on or before the 30th inst.
The Directors do not bind themselves to accept the lowest or any tender.
R. MORLAND, Engineer and Manager.
Gas-Works, Gloucester, Sept. 6, 1879.

THE COLNE AND MARSDEN LOCAL BOARD.

GAS COAL CONTRACT.

THE Gas Committee of the above Board invite TENDERS for the Supply of good screened GAS COAL, for their Works, delivered at Colne Station in such quantities as their Manager directs, for Twelve months ending Sept. 30, 1880. The probable quantity, about 3000 tons. The Coal to be of good quality and free from all refuse.
Tenders to be endorsed "Tender for Gas Coal," addressed to the undersigned, on or before the 16th of September inst.
The Committee do not bind themselves to accept the lowest or any tender.
THOMAS VARLEY.
Gas-Works, Colne, Lancashire, Sept. 5, 1879.

BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Hali- fax Corporation hereby invite TENDERS for the Supply of COAL for a period of One, Two, or Three years. The Coal must be the best of its kind, and entirely free from shale, dirt, and pyrites, and will be required to be delivered in regular monthly quantities, at the Corporation railway siding at their Works.
Further particulars and forms of tender may be obtained from Mr. Carr, Manager of the Gas-Works.
Tenders, properly endorsed, to be delivered to me on or before Sept. 18, 1879. By order,
A. C. FOSTER, Town Clerk.
Town Hall, Halifax, Aug. 25, 1879.

BOROUGH OF HALIFAX.

TO IRONFOUNDERS.

THE Gas-Works Committee of the Hali- fax Corporation invite TENDERS for the Supply of not less than 3000 yards of Cast-Iron PIPES during the year 1880.
Specifications may be seen, and forms of tender and further information obtained, on application to Mr. Wm. Carr, Engineer, Gas-Works, Halifax.
Tenders, properly endorsed, must be sent to me on or before Thursday, Sept. 18, 1879.
By order,
A. C. FOSTER, Town Clerk.
Town Hall, Sept. 5, 1879.

COMMERCIAL GAS COMPANY.
NOTICE is hereby given that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 3rd of October, 1879, at Twelve o'clock at noon, to receive the Report of the Directors, to declare a Dividend, and for other business.
The Books will be closed for the transfer of Stock from the 20th of September inst. to the 3rd of October next, both days inclusive.
By order of the Board,
EDWARD J. SOUTHWELL, Secretary.
Offices, Stepney, Sept. 5, 1879.

THE BRITISH GASLIGHT COMPANY, LIMITED.
NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office, on WEDNESDAY, the 24th inst., at One o'clock precisely, to transact the usual business, to declare the Dividend for the Half Year ending the 30th of June last, and to elect two Directors and one Auditor in the place of those who go out by rotation, but who are eligible to be re-elected.
Notice is hereby also given that the Transfer Books of the Company will be closed on the 12th, and re-opened on the 25th inst.
By order of the Court of Directors,
FREDERIC LANE LINGING, Secretary.
Chief Office, No. 11, George Yard, Lombard Street, London, E.C., Sept. 3, 1879.
N.B.—Any qualified Proprietor intending to become a candidate for either of the above-mentioned offices is required to signify the same by a written notice under his hand, to be left at the Office twelve days at least previous to the 23rd inst.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their Surplus TAR for One year from the 1st day of October next.
Probable quantity from 130,000 to 150,000 gallons.
Delivery on Company's Works, filled into purchaser's tanks.
Payments, cash monthly.
Sealed tenders, endorsed "Tender for TAR," will be received by the undersigned on or before Monday, the 15th day of September next, but the Directors do not bind themselves to accept the highest or any tender.
W. A. PADFIELD, Secretary.
Gas Offices, North Street, Exeter, Aug. 19, 1879.

SCARBOROUGH GAS-WORKS.

THE Directors of the Scarborough Gas Company are prepared to receive TENDERS for the Construction of Two GASHOLDER-TANKS and other Works.
The drawings and a specification may be seen, and forms of tender obtained, on payment of one guinea (which will be returned if a *bona fide* tender be made according to instructions), on application at the Office of the Company in Scarborough, or at the Office of the Engineer, Mr. G. W. Stevenson, 38, Parliament Street, London, S.W., on and after Thursday, Sept. 4, 1879, and sealed tenders must be sent in to me, endorsed "Tender for Tanks, &c.," on or before Twelve o'clock at noon on Wednesday, the 17th of September.
The Directors do not bind themselves to accept the lowest or any tender.
By order,
WILLIAM J. MOON, Manager.
Scarborough, Aug. 30, 1879.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—
110 Mouthpieces, D-shape, 13 in. by 22 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. 28 Mouthpieces, D-shape, 16 in. by 20 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12 in. Slide-Valves and 12 in. Connections.
Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12 in. Connections.
Exhauster (Jones) to pass about 15,000 feet per hour.
Exhauster (Beales) to pass about 25,000 feet per hour.
Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.
Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.
4-horse power Horizontal Steam-Engine.
Three 4-in. Pumps, with cranked Shafting and a pair Mitre Wheels.
Set of four Purifiers, 12 ft. by 12 ft. by 4 ft., with 12-in. Centre-Valve (Cockeys), and Connections and Lift complete.
Station-Meter by A. Wright and Co., London, with three 12-in. Slide-Valves, and 12-in. Bye-Pass and Connections, to pass about 25,000 feet per hour.
Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.
Gasholder, Double Lift, capacity 100,000 feet.
Gasholder, Double Lift, capacity 240,000 feet.
Two 12-in. Governors, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.
Two 12-in. four-way faced Valves, by Cockey.
For further information, &c., apply to the undersigned.
R. MORLAND, Engineer.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

IN THE CHANCERY OF THE COUNTY PALATINE OF LANCASTER.

MANCHESTER DISTRICT.

In the matter of the Companies Acts, 1862, 1867, and 1877, and in the matter of the Court of Chancery of Lancaster Acts, 1850 and 1854, and in the matter of Bouck and Co., Limited.

TO BE SOLD BY TENDER, in one Lot, the Lands, Works, Plant, and Stocks of Bouck and Company, Limited, at Newton Heath, near Manchester, and at Blackburn, both in the County of Lancaster, and the benefit of and liability to the current contracts.

The following are the particulars:—

FIRST.—AS TO THE NEWTON HEATH WORKS.

1. A plot of land fronting the Rochdale Canal and Varley Street, containing 5191 square yards or thereabouts, and held for the residue of a term of 99 years from the 18th of April, 1853, subject to two yearly chief rents of £62 and £111 0s. 8d., and to the covenants, conditions, and agreements affecting the same.

2. A plot of land fronting the Rochdale Canal and Vickers Street, containing 1096 square yards or thereabouts, and held for the residue of a term of 99 years from the 30th of December, 1850, subject to two yearly chief rents of £6 17s. and £29 13s. 8d., and to the covenants, conditions, and agreements affecting the same.

3. A plot of land fronting Vickers Street, Varley Street, and the Rochdale Canal, containing 3560 square yards or thereabouts, and held for the residue of a term of 999 years from the 18th of July, 1862, subject to two yearly rents of £59 6s. 8d. and £59 6s. 8d., and to the covenants, conditions, and agreements affecting the same.

4. A plot of land fronting James Street and Vickers Street, containing 2096 square yards or thereabouts, and held for the residue of a term of 99 years from the 8th of June, 1857, except the last ten days thereof, subject to a yearly chief rent of £52 8s. 4d., and to the covenants, conditions, and agreements affecting the same.

The buildings, boilers, plant, and stock at these works consist of the following, namely:—

Tar Department.

Two brick-covered Wells, capable of holding respectively 500 tons and 100 tons of tar or thereabouts, with three ram-pumps, suction and delivery pipes from the wells to the stills. 18 wrought-iron Tar Stills, capable of distilling 400 tons of tar or thereabouts per week. Six wrought-iron 8 tons Anthracine Stills, with Cameron pump for removing products attached (which stills respectively have condensers, receivers, and connection-pipes to the wells). 10 elevated wrought-iron Storeage-tanks, capable of holding 80,000 to 90,000 gallons of crude products or thereabouts, with taps and delivery-pipes. A large iron Pitch Shed, with corrugated iron roof, and a brick-built Pitch House, capable of cooling 300 tons of pitch or thereabouts per week. One brick-built Anthracine Shed, containing cooling and storeage-tanks, four filter presses, two hydraulic presses with pumps and fittings, together with a 4-in. Cameron pump for pumping anthracine oils, with piping and fittings attached. Two brick Creosote Wells, capable of holding respectively 170,000 gallons and 1000 gallons or thereabouts, with ram-pump, suction and delivery pipes. Nine Naphtha-rectifying Stills, total capacity of 10,200 gallons or thereabouts, with small vertical engine. Four Ram-pumps, for charging these stills, together with condensers, receivers, and fittings. Two wrought-iron horizontal Reception Agitators, capacity 3000 gallons or thereabouts, with small vertical engine and driving-gear attached. Three wrought-iron Storeage-tanks, capable of holding 4000 gallons of rectified naphthas or thereabouts. Carbolic Acid Plant, comprising two cisterns for agitation, capacity 1000 gallons each or thereabouts, with neutralizing-tank. Two Cameron Air-pumps, with suction and delivery pipes and fittings. Four Ram-pumps and a vertical engine with pumps attached, for lifting water for condensing purposes, with suction and delivery pipes, taps, and fittings. One 12-in. Cameron Pump for discharging tar and liquor from the canal boats, with pipes, taps, and fittings.

Sulphuric Acid Department.

One Sulphuric Acid Chamber, with brimstone furnaces and coke towers, capable of producing 8 tons of acid or thereabouts per day, with one boiling-down pan. Sulphate of Ammonia Plant, with horizontal boiler and tower, capable of working 120 tons of liquor or thereabouts per week. Two wrought-iron Liquor Ammonia Stills, total capacity 8 tons or thereabouts, with ram-pump, purifiers, condensers, and receivers.

Sulphate of Zinc Department.

A number of lead-lined Neutralizing Tanks, with cooling tanks, capable of producing 5 tons or thereabouts per week.

Flour of Sulphur Department.

Four cast-iron Pots, with brick chambers and connections, capable of producing 2 tons of flour of sulphur or thereabouts per week.

Nitric Acid Department.

Six cast-iron Nitric Acid Cylinders, 72 jars and connections.

Nitrate of Lead Department.

Two Stone Mixers, 32 Crystallizing Stones, 16 Earthenware Evaporating Mugs complete.

Boilers, &c.

Three Horizontal Two-Flued Galloway Tube Steam Boilers of the following dimensions—viz., one of 7 ft. diameter by 26 ft. in length; one of 7 ft. diameter by 28 ft. in length, and the remaining one 7 ft. diameter by 24 ft. in length. One small Horizontal Two-Flued Steam Boiler, diameter 7 ft. by 14 ft. in length (all of which boilers have four, five, and six cast-iron flange-pipe connections running through the works). Seven Canal Boats, two Cart Horses and Gearing, three Box Carts, three Lurries, Boiler, Bogie and Float. 36 Tar Barrels. Wheelwright and Joiners Shop. Smithy, with anvil and blacksmith's tools. One Laboratory. Two Offices, and small Office and Store-Room in pitch yard. Watchman's House. One Cart-Weighing Machine, with fittings, and Lodge. Six Platform Weighing Machines. One round brick Chimney, 65 yards high, 80 ft. feathered.

Stocks at these Works.

Raw Materials and Products.—Nitre Cake—Carbolic Acid—Litharge—Nitrate Lead—Flour Sulphur—Sulphate Copper—Sulphate Ammonia—Sundry Drysalteries—Brown Vitriol—Anthracine—Anthracine Oils—Caustic Soda—Copper Precipitate—Rectified Benzole—Naphthas—Packages—Pitch—Nitrate Soda—Tar—Ammonia Water—Crude Naphtha.

SECOND.—AS TO THE BLACKBURN WORKS.

A plot of land at Further Gate, in Blackburn, fronting Forest Street and adjoining the Leeds and Liverpool Canal, containing 4070 superficial square yards or thereabouts, and held for the residue of a term of 21 years from the 1st of October, 1869, subject to a yearly rent of £42 7s. 11d., and to the covenants, conditions, and agreements affecting the same.

The buildings and plant at these works consist of the following:—

A range of brick-built Sheds, including office, store-room, naphtha-rectifying house, and a range of brick-built sheds covering sulphate of ammonia plant and anthracine filtering room.

One square brick Chimney, about 30 yards high.

One brick-built Anthracine Oil Well, capable of holding 200 tons or thereabouts, with suction and delivery pipes attached.

Three brick-built Anthracine Oil Wells, two uncovered and one covered, total capacity 10,000 gallons or thereabouts, with suction and delivery pipes attached to each.

One brick-built Creosote Well (covered), capable of holding 76,000 gallons or thereabouts, with delivery and suction pipes.

Two wrought-iron Tar Stills, capable of working 70 tons of tar or thereabouts per week, with wrought-iron condenser, tanks, worms, and receivers to each, together with connection pipes to well.

One damaged cast-iron Still, capable of holding 18 tons or thereabouts, with worm, condenser, tank, and connections.

Two wrought-iron Ammonia Stills, total capacity 20 tons or thereabouts, with nozzles, agitators, delivery and discharging pipes, together with lead-lined fishing-box, drainer, and two lead-lined sulphuric acid tanks.

One Naphtha-rectifying Still, capable of working 1200 gallons or thereabouts, with lead worm condenser.

Four wrought-iron Storeage-tanks, total capacity 9500 gallons or thereabouts, with delivery and discharge pipes.

Anthracine Plant, with hydraulic press, range of filter bags and wooden troughs, together with delivery pipe connections.

Platform Weighing Machine.

One 2-flued Steam Boiler of about 20 nominal horse power, with mountings and steam connections through yard.

One Vertical Engine, working by shaft and eccentrics; two small Water-Rams; and three Ram-Pumps for tar and liquor, with taps, pipes, and connections to stills and store-tanks.

One 4-in. Cameron Pump, for water, with fittings.

Two wrought-iron Pitch Coolers, one 33 ft. long by 5 ft. wide by 3 ft. 6 in. deep, and one 37 ft. long by 5 ft. wide by 3 ft. 6 in. deep.

Pitch Bay, lined with flags, capable of holding 30 tons of pitch or thereabouts. Seven Tar Barrels, one Lurry, two Carts, two Railway Waggons.

Stores at these Works.

Raw Materials and Products.—Tar—Anthracine Oil—Pitch—Ammonia Water—Sulphate of Ammonia—Anthracine—Crude Naphtha and Light Oil.

The purchaser will be required to take all such quantities of the stocks and stores, both at the Newton Heath and Blackburn Works, as may be ascertained to be on the Company's Works respectively on the date fixed for the completion of the purchase, at certain prices, of which a schedule can be seen at the Offices of the Official Liquidator on any day prior to September 19, 1879.

The purchaser will also be required to take over and complete the various buying and selling contracts respectively, which have been entered into by, or on behalf of, or with the Company, and which are still partially unperformed.

Copies of these contracts, together with an estimate of the extent to which they have been severally performed, may be seen at the Offices of the Official Liquidator, on any day prior to the said 19th of September, 1879.

Sealed tenders, endorsed "Tender for Bouck and Company's Property, Limited," and addressed to Mr. Ebenezer Adamson, 25, Booth Street, Manchester, will be received at his Office up to Twelve at noon, on Friday, the 19th day of September, 1879.

The vendor does not bind himself to accept the highest or any tender.

Cards to view, copies of the contracts, and a print of the particulars, conditions of sale, and form of tender, with any other information, can be obtained at the Offices of the District Registrar, Cross Street Chambers, 78, Cross Street, Manchester; of the Official Liquidator, Mr. Ebenezer Adamson, 25, Booth Street, Manchester; or Messrs. Brett & Craven, Solicitors, 3, Kennedy Street, Manchester.

OLDBURY LOCAL BOARD GAS-WORKS.

THE Oldbury Local Board are prepared to receive TENDERS for the Erection of a New GAS-WORKS, to supply their district with gas.

The drawings and specification may be seen on application to the Engineer, Mr. A. Upward, 8, Queen Anne's Gate, Westminster, on and after Wednesday, Sept. 10, 1879, and sealed tenders are to be delivered to me, the undersigned, on or before Wednesday, Oct. 1, 1879, addressed to the Chairman and Members of the Oldbury Local Board.

Forms of tender may be obtained at the Office of the Engineer on payment of one guinea, which will be returned on the receipt of a *bona fide* tender on the form supplied.

The Board do not bind themselves to accept the lowest or any tender.

A. Wright, Solicitor, Clerk to the Board.

Board Room, Oldbury, Aug. 8, 1879.

ALFRED LASS, F.I.Accts.,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

W. C. HOLMES & Co.,

ENGINEERS AND CONTRACTORS

FOR

GAS AND WATER-WORKS,

HUDDERSFIELD.

REFERENCES TO UPWARDS OF 400 WORKS.

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John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

MESSRS. W. C. HOLMES AND CO., Engineers and Contractors for Gas-Works, beg to state that they have sold the whole of their old stock and machinery, and have taken larger and more commodious Works with new and improved machinery. They are enabled to supply all Gas Apparatus and Gasholders at lower prices than hitherto.

Address W. C. Holmes and Co. (late Whitestone Iron-Works), Tunbridge Iron-Works, Huddersfield.

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Parties about to extend their Gas-Works or erect same, may view, and purchase at low prices, as the whole is being cleared out for railway extensions.

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CONSULTING GAS ENGINEER,

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HENRY LYON (14 years Engineer and Manager of the largest of the Manchester Corporation Gas-Works) Mechanical and Consulting Gas Engineer, reports upon the condition and value of Gas-Works, supplies plans and specifications of all Apparatus appertaining to Gas-Works, and re-models existing Works.

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Mr. ROBERT DEMPSTER,

CONSULTING GAS ENGINEER,

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Speaking of these burners, erected on the Thames Embankment, the Governor of The Gaslight and Coke Company, at the half-yearly meeting, Aug. 15, 1879, says:
"Any gentleman who may wish to see the light, may do so at the foot of Westminster Bridge, where it is in direct contiguity with the electric light, so that he will be able to judge for himself. There is a light there that completely excels the electric light in the intensity of its illumination, and in the scope of its diffusion. The lamps on Westminster Bridge are some of Mr. Wigham's."
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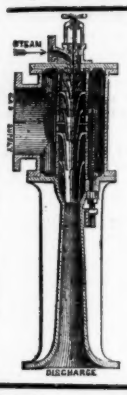

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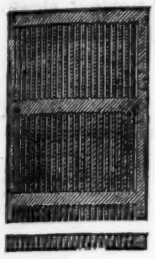

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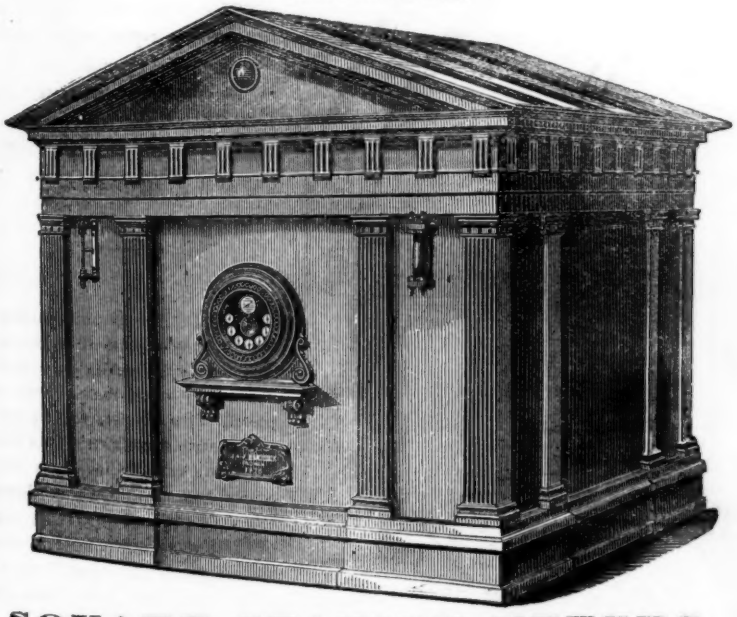

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NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

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Prices on application.

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Results obtained from WILLIAM SUGG'S large Argands for Street Lighting, by Mr. William King, Engineer to the Liverpool United Gas Company:—

ARGAND BURNER, WITH TWO CONCENTRIC FLAMES.

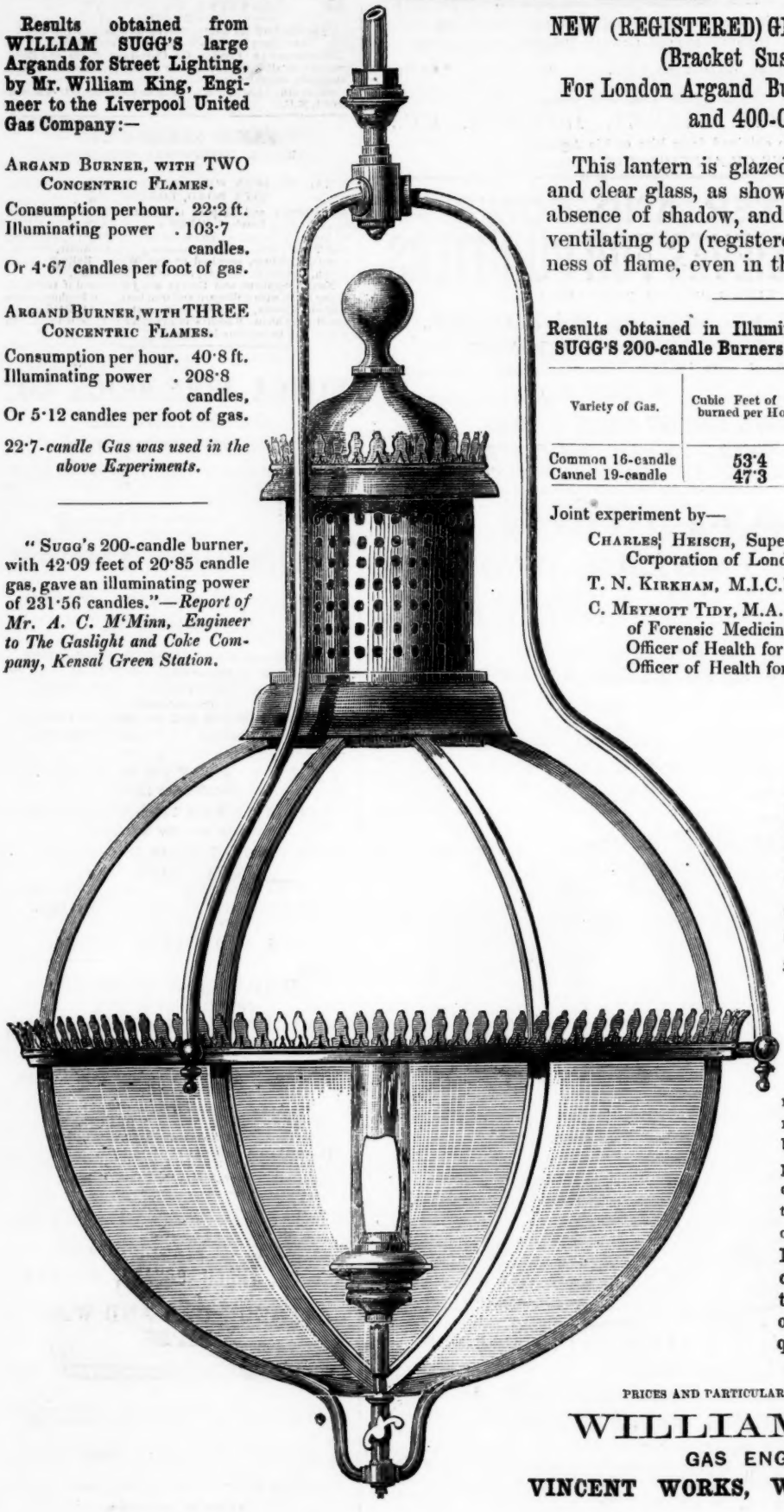
Consumption per hour. 22·2 ft.
Illuminating power . 103·7 candles.
Or 4·67 candles per foot of gas.

ARGAND BURNER, WITH THREE CONCENTRIC FLAMES.

Consumption per hour. 40·8 ft.
Illuminating power . 208·8 candles,
Or 5·12 candles per foot of gas.

22·7-*candle Gas was used in the above Experiments.*

"SUGG'S 200-candle burner, with 42·09 feet of 20·85 candle gas, gave an illuminating power of 231·56 candles."—*Report of Mr. A. C. M'Minn, Engineer to The Gaslight and Coke Company, Kensal Green Station.*



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This lantern is glazed with opal reflecting panes and clear glass, as shown, thus securing an entire absence of shadow, and is fitted with the new self-ventilating top (registered), ensuring perfect steadiness of flame, even in the heaviest gale of wind.

Results obtained in Illuminating Power from WILLIAM SUGG'S 200-candle Burners with Cannel and Common Gas:—

Variety of Gas.	Cubic Feet of Gas burned per Hour.	Illuminating Power in Sperm Candles burning 120 Grains per Hour.	Number of Candles to which every Cubic Foot of Gas burned is equivalent.
Common 16-candle	53·4	228	4·25
Cannel 19-candle	47·3	252	4·76

Joint experiment by—

CHARLES HEISCH, Superintending Gas Examiner to the Corporation of London.

T. N. KIRKHAM, M.I.C.E., F.C.S.

C. MEYMOTT TIDY, M.A., M.B., Professor of Chemistry and of Forensic Medicine at the London Hospital, Medical Officer of Health for Islington, and late Deputy Medical Officer of Health for the City of London.

"The light exhibited last night (SUGG'S 200-candle burner and lantern) was equal to 360 candles—more than double that given by the old lamps, while the consumption of gas was exactly the same—40 feet per hour."—*Glasgow Herald*, April 25, 1879.

NOTICE.—Notwithstanding a number of statements which have been repeated in the public journals, that burners by other makers have surpassed these results, the reports of comparative experiments from which the above extracts have been copied conclusively prove that **the "Sugg" Burners give over 30 per cent. of Illuminating Power more than can be obtained from any other burners with the like quantity of gas.**

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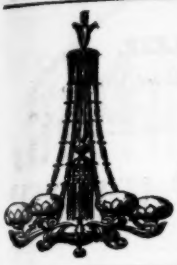

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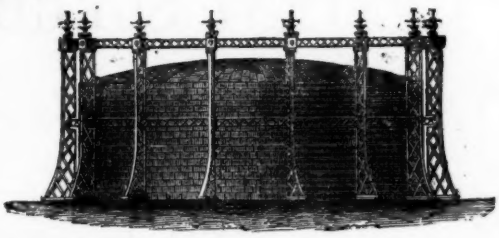

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ALSO

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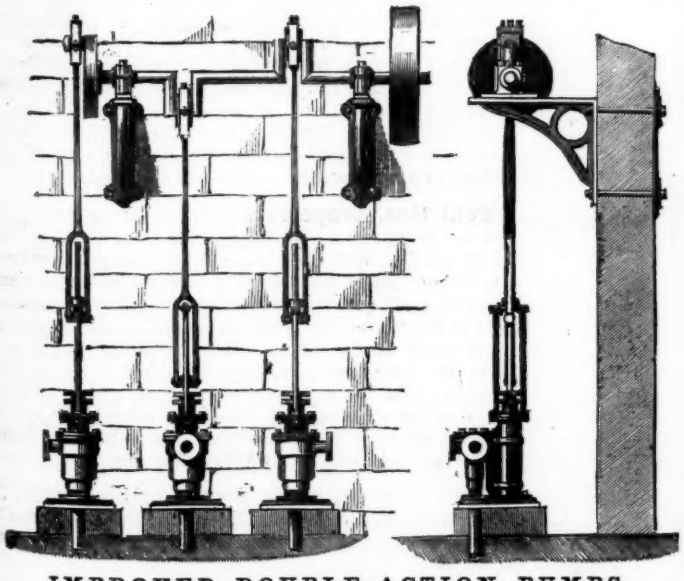

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For Water. For Tar. For Ammoniacal Liquor.

This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction

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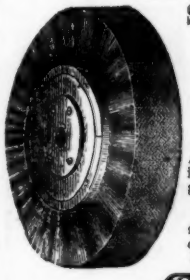

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Circular Casting Brushes for Lathes and Brooms,

Admirably adapted for Cleaning Hot Castings, &c., and for general use in foundries, gas-works, chemical works, &c.

As Supplied to the Government and the leading English and Foreign Engineers, Gas-Works, &c.

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No. 1, Brush,	3in.	wire,	2	rows,	15s.	dozen.		
,, 2, ,,	5	,,	round,		22s. 6d.	,,		
,, 3, ,,	3	,,	4	rows,	22s. 6d.	,,		
,, 4, ,,	2	,,	4	,,	21s.	,,		
,, 5, ,,	3	,,	4	,,	22s. 6d.	,,		
,, 6, Broom,	12in.	block,	7	in. wire,	4	rows,	72s.	per dozen.
,, 7, ,,	16	,,	7	,,	4	,,	90s.	,,
,, 8, ,,	upright,		7	,,	2	,,	48s.	,,
,, 9, ,,	12in.	block,	7	,,	10	,,	180s.	,,
,, 10, ,,	16	,,	7	,,	10	,,	220s.	,,
,, 11, ,,	12	,,	4	,,	4	,,	66s.	,,
,, 12, ,,	16	,,	4	,,	4	,,	72s.	,,
,, 13, ,,	12	,,	4	,,	10	,,	138s.	,,
,, 14, ,,	16	,,	4	,,	10	,,	180s.	,,

								each
Wheel,	6in.	dia.,	2¼	wide,	1¼	wire projects,	5 rows,	½ hole, 10s.
,,	8	,,	2½	,,	1½	,,	6 ,,	½ ,, 18s.
,,	10	,,	3	,,	2½	,,	6 ,,	½ ,, 31s.
,,	12	,,	3½	,,	2½	,,	7 ,,	½ ,, 28s. 6d
,,	14	,,	3½	,,	3½	,,	7 ,,	1 34s.
,,	18	,,	4	,,	3½	,,	8 ,,	1½ 62s. 6d.

The "Champion" Iron Encased Forges.

Are specially suited for General Out-door Purposes, and will be found suitable to any climate.

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1,	8 in. bellows,	to heat 1 in. sq. in 3 min.	£4
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3,	12 in. bellows,	to heat 2 in. sq. in 2 min.	£8
4,	8 in. bellows,	to heat 1 in. sq. in 3 min.	£6
5,	10 in. bellows,	to heat 2 in. sq. in 2 min.	£8
6,	12 in. bellows,	to heat 3 in. sq. in 2 min.	£10
7,	14 in. bellows,	to heat 3½ in. sq. in 2 min.	£12

The "Champion" Iron Encased Forge,

With Vice-Drilling Frame on stand complete.

No. 10, Double Blast, 10 in. bellows, to heat 2 in. sq. in 2 min., £15.

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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

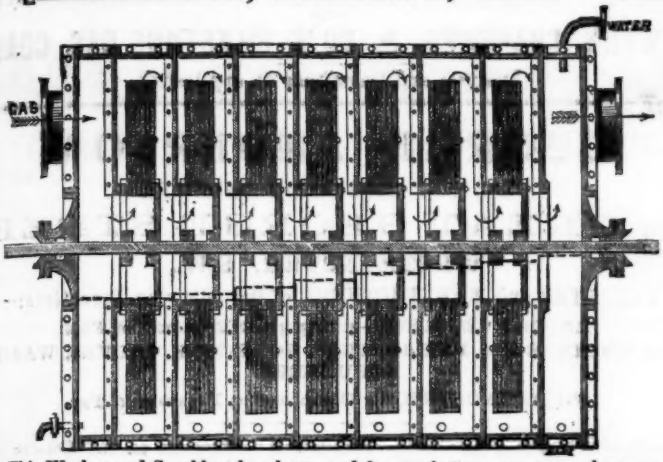
They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

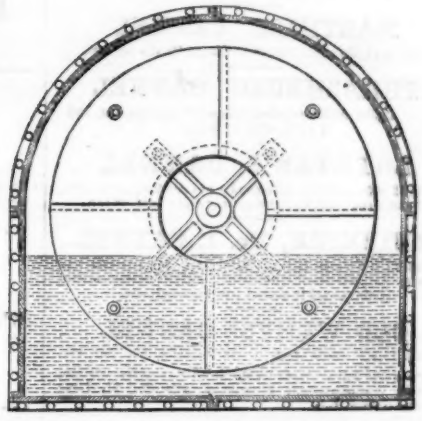
Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

THE

"STANDARD" WASHER & SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]





This Washer and Scrubber has been used for nearly two years on a large scale at the Works of The Gaslight and Coke Company, Bromley-by-Bow, at which station there are now several in operation and in course of construction. There is also one in use at the Pancras Station, King's Cross, of the same Company, which is purifying 1,500,000 cubic feet of gas per day. At the Gas-Works of the Corporation of Leeds, a large one has been erected, which is giving complete satisfaction. The Special Merits of this Washer are as follows:—

That it is a very effective Condenser, so that it is not absolutely necessary to reduce the temperature of the gas to 60°, or thereabouts, to make the Washer effective. That the distribution of the liquor is made with unerring regularity. That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather. That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided. That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas. That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured. That it is much cheaper than any other Scrubber that will do the same amount of work effectually. That it is the only Washer suitable for purifying Gas from all its impurities by solution. That it works with a minimum of pressure. That it takes out every trace of Ammonia from the Gas in once traversing the machine. That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

D. HULETT, Esq. *The Gaslight and Coke Company, Bromley-by-Bow, May* 3, 1877.

Dear Sir,—In answer to your inquiries respecting the results of the working of your Patent Washer, I beg to state that I find it a very efficient machine. I have had it in operation for some time, and passed gas through it continuously at the rate of 100,000 cubic feet per hour, and obtained from it 11 gallons of 10 oz. liquor per ton of coal carbonized—results which appear to me very satisfactory for so small a Washer. It works very smoothly, taking but little power, and giving no pressure. I have it still in operation, and am perfectly satisfied with its working.

I am, dear Sir, yours truly, (Signed) W. B. WRIGHT.

Messrs. KIRKHAM, HULETT, and CHANDLER. *The Leeds Corporation Gas-Works, York Street, Leeds, Dec.* 6, 1878.

Gentlemen,—The Scrubber-Washer erected by you at these works, and which has been in use for six months, has proved to be, so far as we have been able to test it, thoroughly efficient. We are at present making 32,000 feet of gas per hour, and are entirely dependent on this apparatus for the removal of Ammonia, and the **Gas is perfectly free from that impurity in the sixth chamber**, so that four chambers remain to deal with an increasing make of gas. Owing to insufficient condensers, the gas was in the summer admitted to the Scrubber at a temperature of 70°, but was reduced therein to 61°, or that of the atmosphere. The volutes are driven at the rate of four revolutions per minute, and, working at that speed, there is not the slightest difference between the inlet and the outlet pressure. Clean water supplied at the rate of 10 gallons per ton of coal carbonized is converted into liquor of from 10 oz. to 13 oz. strength **in once traversing the vessel.** The apparatus is extremely simple and compact, occupies but little space, and requires no foundation. I shall be surprised if it does not eventually become extremely popular.

I am, Gentlemen, yours faithfully, (Signed) HENRY WOODALL, Engineer.

Messrs. KIRKHAM, HULETT, and CHANDLER. *The Gaslight and Coke Company, York Road, King's Cross, Jan.* 14, 1879.

Gentlemen,—In reply to your inquiry, I am pleased to say, the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia**, while purifying more Gas than it was intended to do. I enclose particulars of a fortnight's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.—I remain, &c. (Signed) JOHN CLARK.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 *feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—*

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 1	8½	6½	5	3½	2½	1½	¾	¼	0	0	10 Gallons.	52,000	Nil.	77°	73°	48°	24	23	7½
" 2	8½	7	6	4½	3½	2¼	1½	¾	¼	0	10 "	57,000	Nil.	73°	66°	32°	21½	20½	4
" 3	9½	8	6	3½	3	2¼	1½	¾	¼	0	10 "	60,000	Nil.	75°	68°	40°	23½	22	4
" 4	9½	7½	6½	4½	3½	2½	1½	¾	¼	0	10 "	65,000	Nil.	74°	68°	33°	24	22½	5
" 5	9½	7	6	4	3	2½	1½	1	¼	0	10 "	34,000	Nil.	77°	68°	35°	14½	14	5
" 6	9¼	7¼	6¼	4½	3	2¼	1½	1	¼	0	10 "	63,000	Nil.	72°	66°	27°	24	22½	4½
" 7	11	9	7	5½	4½	3	1½	1½	¼	0	10 "	59,000	Nil.	74°	66°	31°	25	23½	5
" 8	9½	7½	6	4½	3	2	1	¼	¼	0	10 "	78,000	Nil.	73°	61°	31°	28	26½	6½
" 9	11	9	7	5	3½	2½	1½	1	¼	0	10 "	82,000	Nil.	74°	67°	33°	27½	25½	5
" 10	10½	8½	6½	5	3½	2½	1½	1	¼	0	10 "	66,000	Nil.	76°	64°	28°	28½	27	5
" 11	12½	10	7½	5½	4½	3½	1½	1½	¼	0	10 "	61,000	Nil.	73°	64°	27°	26½	25½	5
" 12	11	8½	6½	—	—	—	1½	¾	¼	0	10 "	39,000	Nil.	74°	64°	27°	26½	25½	5
" 13	13	10½	8¼	6	4½	3½	2	1½	¾	0	10 "	78,000	Nil.	73°	65°	42°	28	26	5

Messrs. KIRKHAM, HULETT, and CHANDLER. *Corporation of Birmingham, Gas Department, Saltley Works, May* 23, 1879.

Gentlemen,—I beg to enclose you a copy of the results of the tests which, by the kind permission of the Engineer, Mr. Clark, I made on the 6th of March last, of the working of one of your "Standard" Washers and Scrubbers at the St. Pancras Station of The Gaslight and Coke Company, and I am of opinion that, for an apparatus occupying so small a space, they are exceedingly satisfactory.—Yours truly, HENRY HACK, Engineer.

Working Results obtained from KIRKHAM, HULETT, *and* CHANDLER'S *Patent "Standard" Washer and Scrubber at the St. Pancras Station of The Gaslight and Coke Company, London, March* 6, 1879.

Gas passing per Hour, Cubic Feet.	—	Impurities in Gas per 100 Cubic Feet.			Temperature.		Pressure in Inches.	Revolution of Apparatus per Minute.	—	No. of Divisions and Strength of Liquor.										Water Used during Experiment. Gallons.
		SH_2	CO_2.	Grains. NH_3.	Washer.	Air.				—	—	—	—	—	—	—	—	—	—	
64,000	Inlet	2·00	2·00	158·3	72	57	21	4½	Twaddel deg. at 60°	5·3	4·9	2·85	2·35	1·7	1·05	0·6	0·3	0·13	0·1	63
	Outlet	1·50	1·50	0·3	68	57	20		Acid, ounces. . .	11·0	8·4	6·3	4·5	2·7	1·7	1·3	0·7	0·3	—	

WASHER-SCRUBBERS OF THIS PATENT ARE IN COURSE OF CONSTRUCTION FOR BECKTON, BRADFORD, GREENWICH, WOOLWICH, AND SEVERAL OTHER GAS-WORKS.

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Yields 14,920 cubic feet of 40·92-candle gas per ton.

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12,580 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

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Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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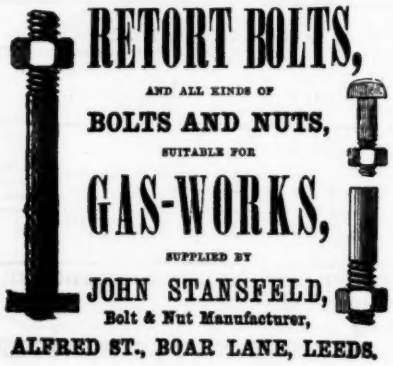

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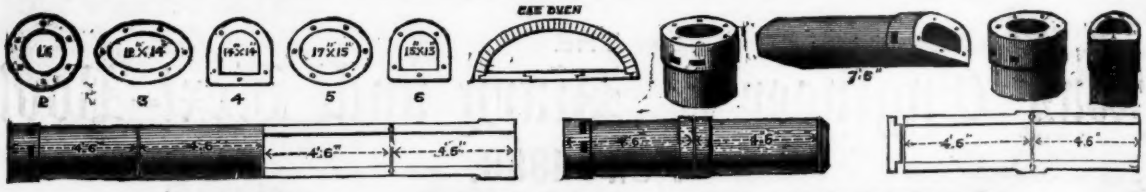

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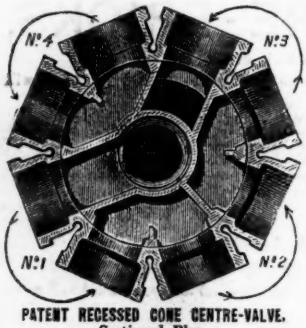

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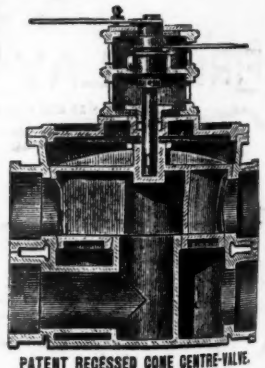
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